visual engineering
LIGHTWARE

User's Manual

HDMI-TPS-TX210, HDMI-TPS-TX220
HDMI-TPS-TX226
DVI-HDCP-TPS-TX210, DVI-HDCP-TPS-TX220
DP-TPS-TX210, DP-TPS-TX220
SW4-TPS-TX240, SW4-TPS-TX240-Plus

HDBaseT™ Multimedia Extender

v3.7 12-12-2023

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, leave the ventilation holes free and never block or bypass the ventilators (if there are any).

WARNING

To prevent injury, the apparatus is recommended to be securely attached to the floor/wall or mounted in accordance with the installation instructions. The apparatus shall not be exposed to dripping or splashing, and no objects filled with liquids, such as vases, shall be placed on the apparatus. No naked flame sources, such as lit 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 that is highly recommended to read and keep in every case!

ATTENTION! Useful information for performing 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 that 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 clicking on 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	2.7.1b5
Lightware Device Updater V2 (LDU v2) software	2.19.0b4
Firmware package version	1.3.6b2
Hardware	1.2

Document revision: **v3.7**

Release date: **12-12-2023**

Editor: Nikolett Keindl

About Printing

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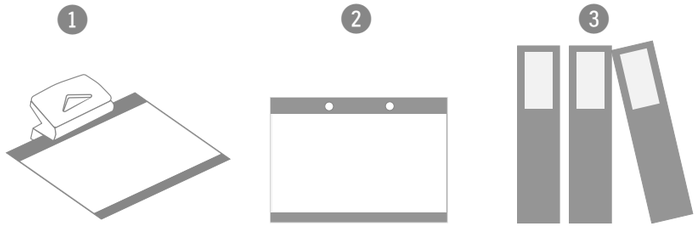
- Orientation: Landscape



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

Hashtag (#) Keywords in the Document

This user's manual contains keywords with hashtags (#) to help you 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 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

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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

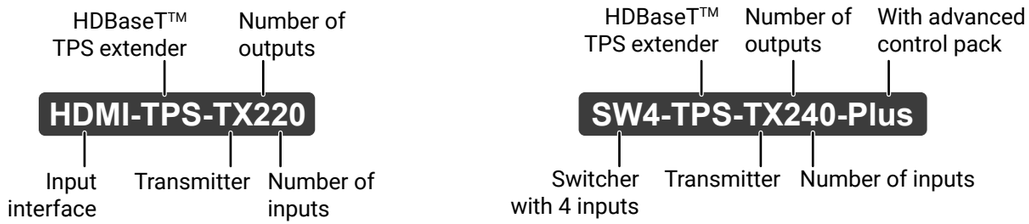
This transmitter family was designed to extend digital video signals (e.g. HDMI 1.4 and DP 1.1) and audio signals (analog stereo audio from local input or embedded 7.1 HBR audio). Video signals with HDCP encryption are also supported. Many combinations of the audio/video signals are available for transmission.

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 to conform 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 in the transmitters (except in HDMI-TPS-TX226 model, which is not PoE-compatible). 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.

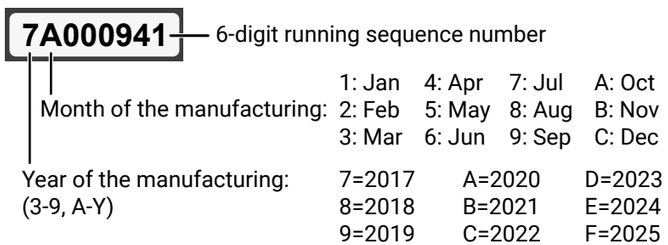
Advanced models contain an 8-pole Phoenix® connector with user-configurable General Purpose Input and Output pins. Using the built-in Event manager with the GPIO pins, many controlling functions can be established in a simple way.

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:

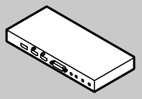
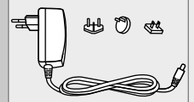
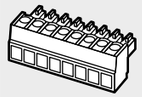


1.2. Compatible Devices

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.

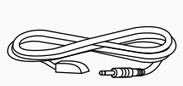
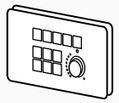
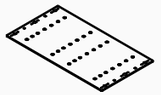
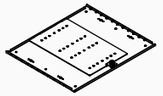
1.3. Box Contents

1.3.1. Supplied Accessories

	Supplied devices	Supplied accessories			
					
	Transmitter device	12V DC power adaptor	Phoenix® Combicon 3-pole connector	Phoenix® Combicon 8-pole connector	Safety and warranty info, QSG
HDMI-TPS-TX210	✓	✓	✓	-	✓
HDMI-TPS-TX220	✓	✓	✓	✓	✓
HDMI-TPS-TX226	✓	✓	✓	✓	✓
DVI-HDCP-TPS-TX210	✓	✓	✓	-	✓
DVI-HDCP-TPS-TX220	✓	✓	✓	✓	✓
DP-TPS-TX210	✓	✓	✓	-	✓
DP-TPS-TX220	✓	✓	✓	✓	✓
SW4-TPS-TX240	✓	✓	✓	✓	✓
SW4-TPS-TX240-Plus	✓	✓	✓	✓	✓

1.3.2. Optional Accessories

The optional accessories can be purchased separately; please contact sales@lightware.com.

	Optional accessories								
									
	Infrared emitter unit	Room Automation Device (RAP-B511 / RAC-B501)	TBP6 button panel	TPS-PI-1P1 remote power injector	PSU2x rack mountable power supply unit	1U high rack shelf	UD Mounting Kit Double	UD Mounting Plate F120	UD Mounting Pro P140
HDMI-TPS-TX210	✓	✓	✓	✓	✓	✓	✓	✓	✓
HDMI-TPS-TX220	✓	✓	✓	✓	✓	✓	✓	✓	✓
HDMI-TPS-TX226	✓	✓	✓	✓	✓	✓	✓	✓	✓
DVI-HDCP-TPS-TX210	✓	✓	✓	✓	✓	✓	✓	✓	✓
DVI-HDCP-TPS-TX220	✓	✓	✓	✓	✓	✓	✓	✓	✓
DP-TPS-TX210	✓	✓	✓	✓	✓	✓	✓	✓	✓
DP-TPS-TX220	✓	✓	✓	✓	✓	✓	✓	✓	✓
SW4-TPS-TX240	✓	✓	✓	✓	✓	✓	✓	✓	✓
SW4-TPS-TX240-Plus	✓	✓	✓	✓	✓	✓	✓	✓	✓

1.4. Features

1.4.1. List of features (in alphabetical order)

DIFFERENCE: The availability of the features is device-dependent, see the table at the following page.

4K and 3D Support

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

Audio Embedder and De-embedder Function

The analog audio can be embedded to HDMI outputs and embedded audio can be routed to the analog audio output.

Autoselect Function for Video Inputs

The Autoselect feature can sense the port status on the input ports and select one of them automatically. Various modes are available: first detect, last detect, priority detect.

Basic IT-security

These entry-level network security improvements help prevent unauthorized access to the Lightware device: cleartext login, TCP port blocking and MAC address filtering.

Batch of Commands

A batch of LW3 commands (salvo) can be run by the Lightware device either by a previously stored macro or by sending a file to the device with the desired commands.

Consumer Electronics Control

Supports transmitting standard CEC commands in order to remote control the source or sink device.

Dark Mode

Rental application requires this function, which keeps the LEDs unlit to hide the device during an event.

Deep Color Support and Conversion

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

Ethernet Control

Multiple simultaneous TCP/IP connections are available with a simple ASCII-based protocol for controlling, configuring the receiver or perform a firmware update.

Event Manager

The Event Manager tool takes care of all the necessary control in a smaller configuration by performing predefined actions in response to device status changes.

Event Manager +

Triggering a condition, defining variables and checking two conditions for an action – these features are available via the improved Event Manager.

Forced Button Lock

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

Frame Detector

The exact video and audio signal format can be determined such as timing, frequencies, scan mode, HDCP encryption, color range, color space and audio sample rate.

GPIO Control Port

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

HDCP-compliant

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

Infra 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.

Miniweb

The Miniweb is able to display an adaptive surface with a virtual crosspoint and buttons for Event manager Actions. The miniweb can be displayed in a mobile device, too.

Pixel Accurate Reclocking

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

RS-232 Recognizer

Support recognizing incoming RS-232 messages to integrate with 3rd party devices like the video conference codec devices.

RS-232 Transmission

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

Remote Power

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

Signal Transmission up to 170m

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

TCP Recognizer

Support recognizing the incoming TCP messages to integrate with 3rd party devices like the video conference codec devices.

1.4.2. Feature Availability

	Basic features														Advanced Control Pack (from FW package v1.2.0b13)					Advanced Control Pack v3 (from FW package v1.3.0b6)			
	4K and 3D Support	Audio Embedder and De-embedder Function	Autoselect Function for Video Inputs	Deep Color Support and Conversion	Ethernet Control	Event Manager	Forced Button Lock	Frame Detector	GPIO Control Port	HDCP-compliant	Pixel Accurate Reclocking	RS-232 Transmission	Remote Power	Signal Transmission up to 170m	Consumer Electronics Control	Miniweb	Dark Mode	Infra Code Sending	RS-232 Recognizer	Basic IT Security	Batch Coamnds	Event Manager +	TCP Recognizer
HDMI-TPS-TX210	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	-	✓	✓	-	-	-	-	✓ [2]	-
HDMI-TPS-TX220	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	-	-	-	-	✓ [2]	-
HDMI-TPS-TX226	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ [1]	✓	-	✓	✓	-	-	-	-	✓ [2]	-
DVI-HDCP-TPS-TX210	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	-	✓	✓	-	-	-	-	✓ [2]	-
DVI-HDCP-TPS-TX220	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	-	-	-	-	✓ [2]	-
DP-TPS-TX210	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	-	✓	✓	-	-	-	-	✓ [2]	-
DP-TPS-TX220	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	-	-	-	-	✓ [2]	-
SW4-TPS-TX240	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	-	-	-	-	✓ [2]	-
SW4-TPS-TX240-Plus	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

[1] The remote power feature of HDMI-TPS-TX226 is not PoE-compatible; see the HDMI-TPS-TX226 section for more information.

[2] Only the **Combine Links** feature is available in these devices.

1.5. Model Comparison

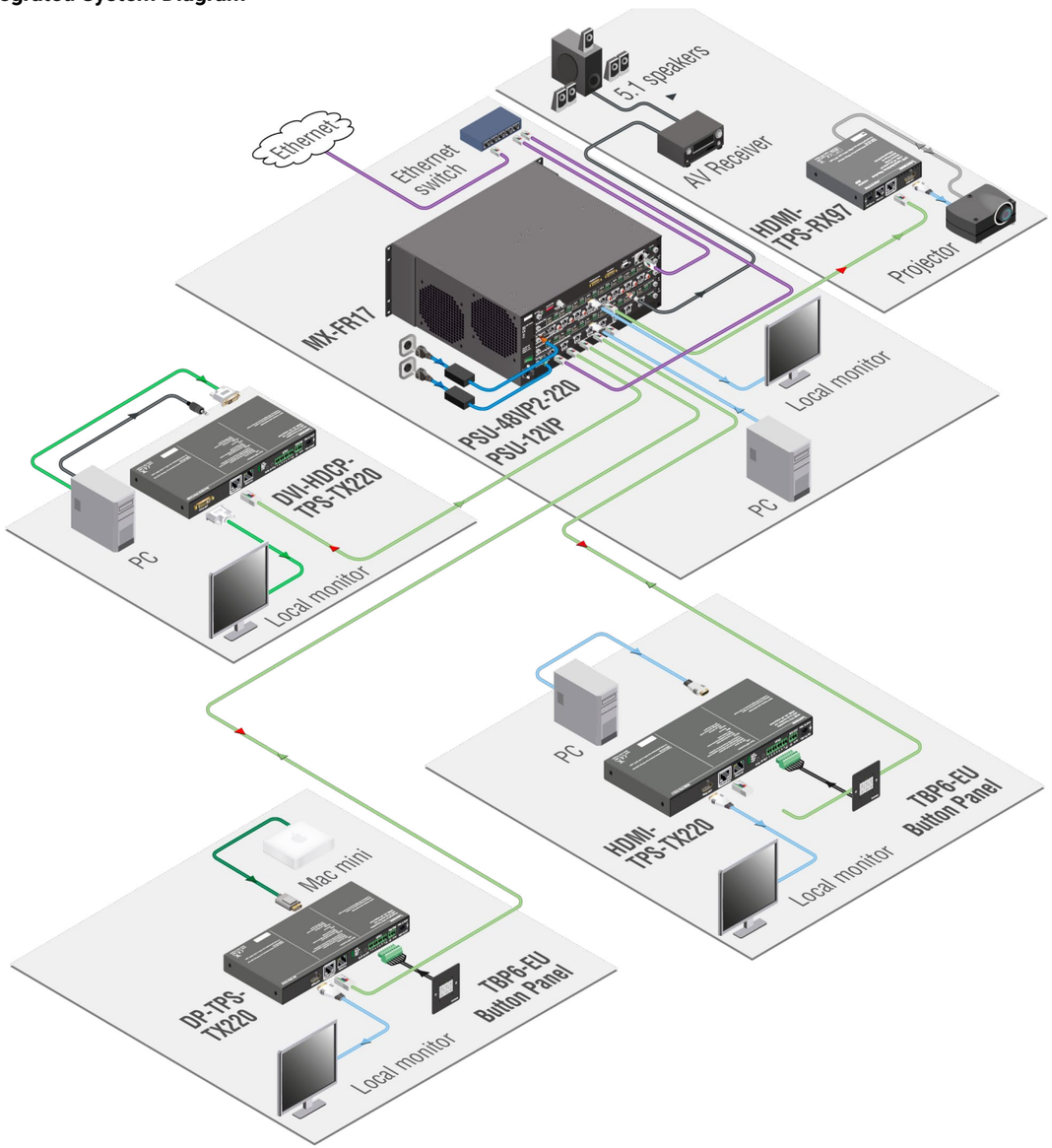
The available models have different features depending on their design, see the table below:

	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	Advanced Control Pack **v3**
HDMI-TPS-TX210	✓	✓	✓	-	-	-	✓	-	✓	✓	✓	✓	-	20	10 kB	✓	- [1]	-
HDMI-TPS-TX220	✓	✓	✓	-	-	✓	✓	-	✓	✓	✓	✓	✓	20	10 kB	✓	- [1]	-
HDMI-TPS-TX226	✓	-	✓	-	-	✓	✓	-	✓	✓	✓	✓	✓	20	10 kB	✓	- [1]	-
DVI-HDCP-TPS-TX210	✓	✓	-	✓	-	-	-	✓	✓	✓	✓	✓	-	20	10 kB	✓	- [1]	-
DVI-HDCP-TPS-TX220	✓	✓	-	✓	-	✓	-	✓	✓	✓	✓	✓	✓	20	10 kB	✓	- [1]	-
DP-TPS-TX210	✓	✓	-	-	✓	-	✓	-	✓	✓	✓	✓	-	20	10 kB	✓	- [1]	-
DP-TPS-TX220	✓	✓	-	-	✓	✓	✓	-	✓	✓	✓	✓	✓	20	10 kB	✓	- [1]	-
SW4-TPS-TX240	✓	✓	✓(2x)	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	20	10 kB	✓	- [1]	-
SW4-TPS-TX240-Plus	✓	✓	✓(2x)	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	100	80 kB	✓	✓	✓

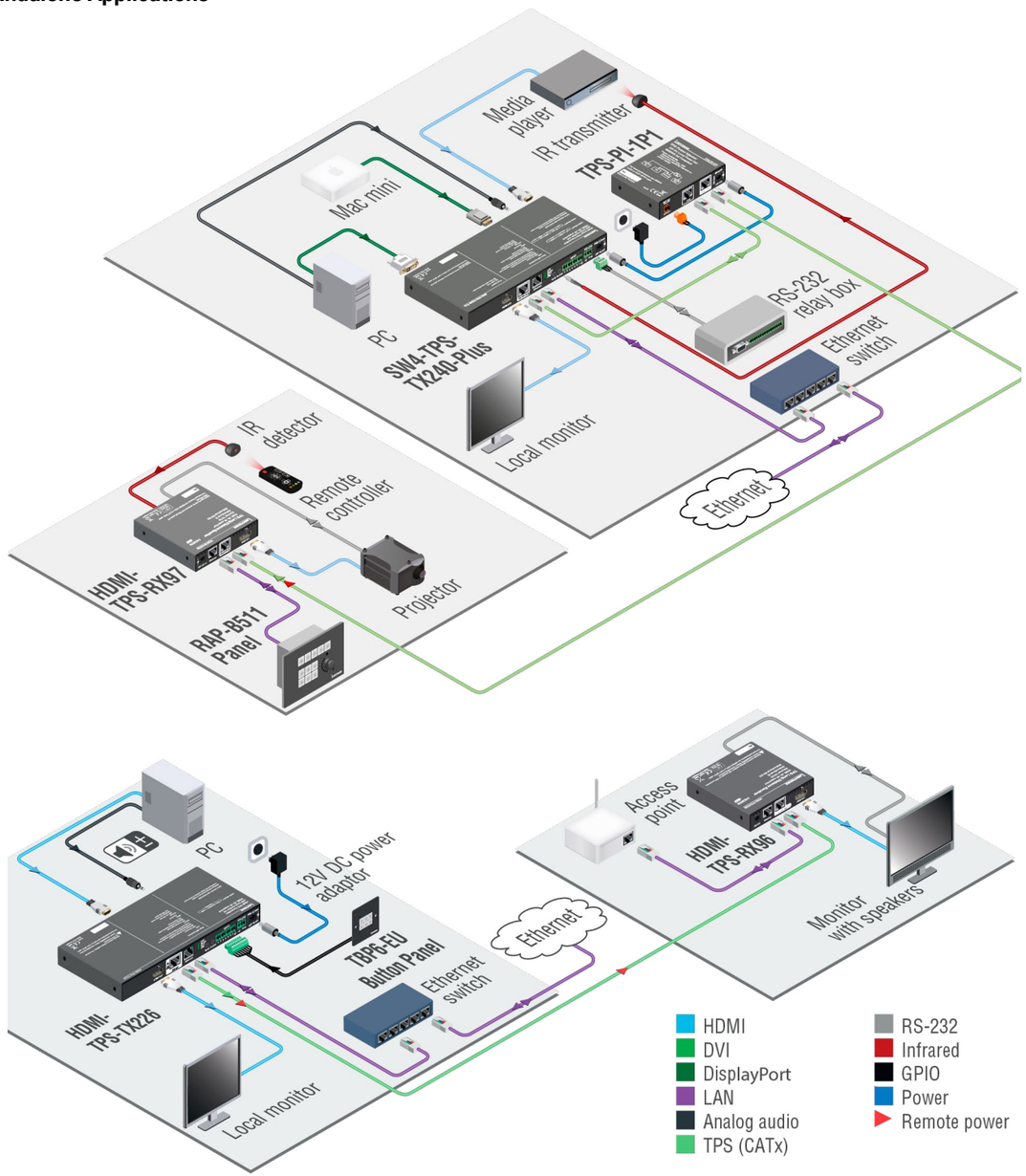
[1] Partially supported; see the table at the previous page.

1.6. Typical Applications

Integrated System Diagram



Standalone Applications



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 and HDMI-TPS-TX226

DVI-HDCP-TPS-TX210

DVI-HDCP-TPS-TX220

DP-TPS-TX210

DP-TPS-TX220

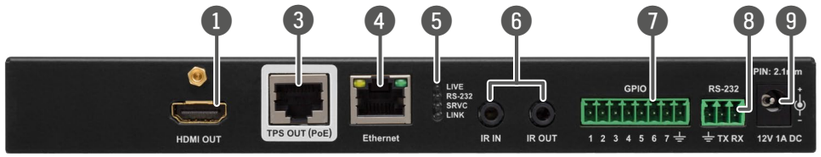
SW4-TPS-TX240 and SW4-TPS-TX240-Plus

1	**HDCP LED**	The LED gives feedback about the HDCP status of the output signal. See the details in the Front Panel LEDs section.
2	**Autoselect LED**	The 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 update (bootload) mode, DHCP settings, restore factory default settings, condition launching in Event Manager).

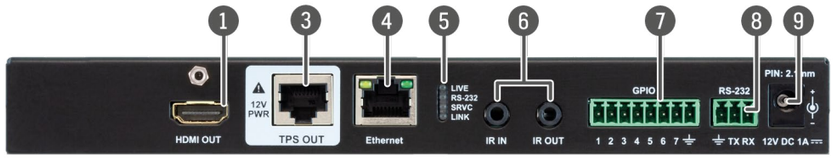
2.2. Rear Views

HDMI-TPS-TX210

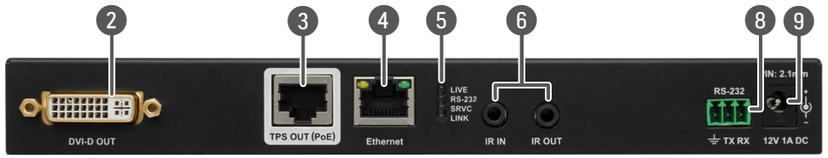
HDMI-TPS-TX220



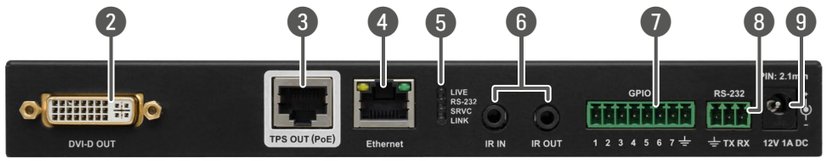
HDMI-TPS-TX226



DVI-HDCP-TPS-TX210

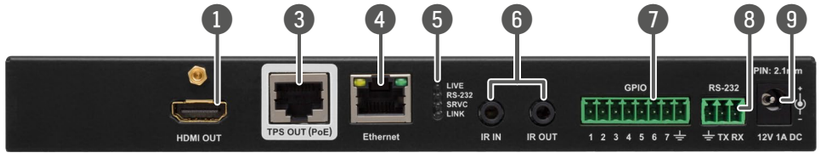


DVI-HDCP-TPS-TX220



DP-TPS-TX210

DP-TPS-TX220, SW4-TPS-TX240 and SW4-TPS-TX240-Plus



1	**HDMI output**	Local HDMI output with the same AV content as the TPS output.
2	**DVI-D output**	Local DVI-D output with the same AV 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 updating 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 of 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 update (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:

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

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

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:

Embedded digital audio → Analog audio

DIFFERENCE: This order refers to HDMI-TPS-TX220, DVI-HDCP-TPS-TX220, DP-TPS-TX220, SW4-TPS-TX240 and SW4-TPS-TX240-Plus models.

2.5.3. Programmable Show Me Button

An 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*

HighlightMe (Default Function)

DIFFERENCE: This feature is available only from FW package v1.3.0b6.

This feature is to help find the desired device in the Device discovery window of the Lightware Device Controller software. Press the **Show Me** button for **5 seconds** until the front panel LEDs start to blink slowly, then release the button. In parallel, the device is **highlighted in green for 4 seconds** in the Device discovery window of the LDC, see the HighlightMe (Default Function) section.

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.

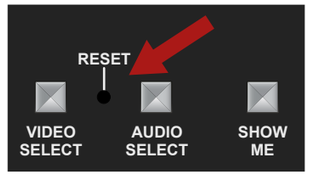
Step 2. Press and keep pressing the **Show Me** button for 10 seconds. After 5 seconds the front panel LEDs start blinking, but keep on pressing the button.

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



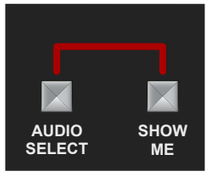
In a few cases (after firmware update, etc) you may need to reset the device. Pushing the reset button is the same as disconnecting and reconnecting the power adaptor to the transmitter. To reset the device, follow the steps:

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 the previous section.

2.5.7. Control Lock



Press the Front 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, the front panel LEDs blink 3 times.

2.5.8. Entering Firmware Update Mode

It may happen that the firmware update process is not successful and the device cannot be switched to bootload mode automatically. In this case, the device can be forced into firmware update 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 update mode, the LIVE LED is blinking quickly (less than 500 ms duty cycle). The other LEDs are off.

The procedure of firmware update can be found in the Firmware Update 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 a 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:

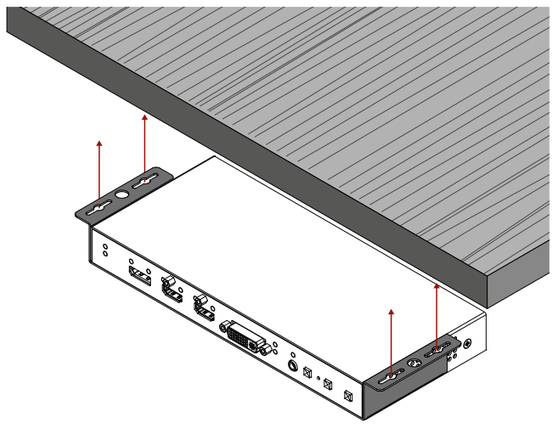
More details about the accessories and the mounting can be found in the Mounting Assembly Guide.

3.1.1. Under-Desk Mounting Options

Under-desk Double Mounting Kit

Under-desk double mounting kit

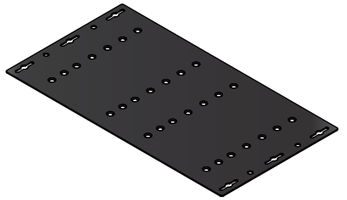
The Under-desk double mounting kit makes it easy to mount a single device on any flat surface, e.g. furniture. 1U high rack shelf provides mounting holes for fastening two half-rack or four quarter-rack sized units. Pocket-sized devices can also be fastened to the shelf. To order mounting accessories, 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.

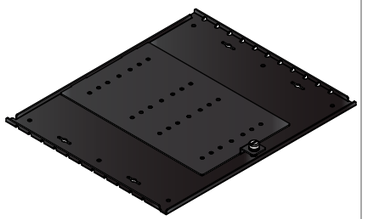
UD Mounting Plate F120

Accessory	Number of mountable devices	Features
UD Mounting Plate F120 	1 half-rack sized	Lightweight design

INFO: For more details about the options of the applications and the assembly steps, please download the **Mounting Accessory Guide** from our website: https://lightware.com/pub/media/lightware/filedownloader/file/Assembly-Guide/Mounting_AG.pdf

#new

UD Mounting Pro P140

Accessory	Number of mountable devices	Features
UD Mounting Pro P140 	1 half-rack sized	Easy to change the mounted devices

INFO: For more details about the options of the applications and the assembly steps, please download the **Mounting Accessory Guide** from our website: https://lightware.com/pub/media/lightware/filedownloader/file/Assembly-Guide/Mounting_AG.pdf

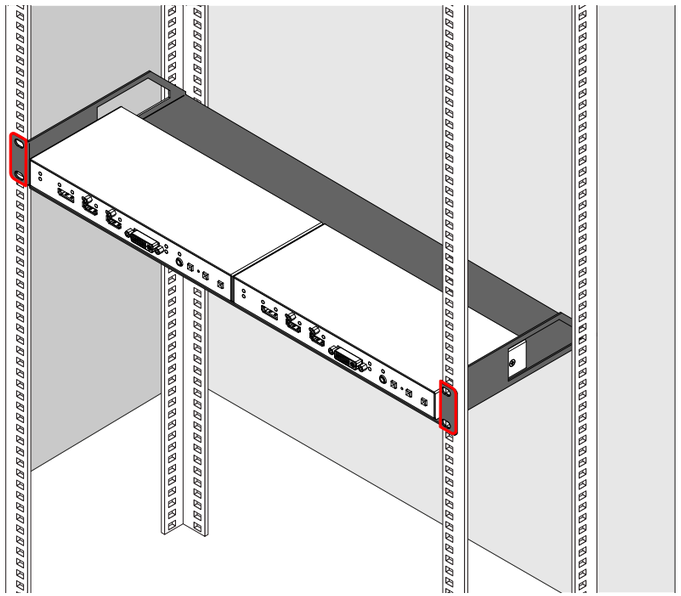
#new

3.1.2. Rack Shelf Mounting Options

1U High Rack Shelf

1U high rack shelf

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



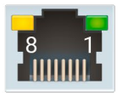
3.2. Electrical Connections

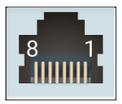
3.2.1. RJ45 Connectors (TPS and LAN Ports)

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

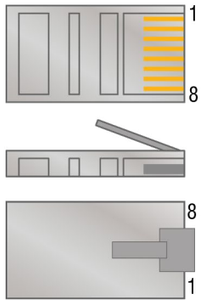
The Wiring of TPS and LAN Cables

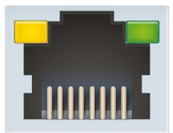
Lightware recommends the termination of LAN cables on the basis of TIA/EIA T 568 A or TIA/EIA T 568 B standards.





Pin	TIA/EIA T568A	TIA/EIA T568B
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





Ethernet port

	LED1, amber	LED2, green
OFF	no link	10 Mbps
Blinking	activity	N/A
ON	link is active	100 Mbps

Ethernet LED States

3.2.2. DVI-I Connector

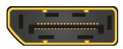
DVI-HDCP-TPS-TX210/TX220, SW4-TPS-TX240 and TX240-Plus transmitters provide 29-pole „digital only" DVI-I Dual-Link connectors (only digital pins are internally connected) for input and local output. This way, users can plug it into any DVI connector, but keep in mind that analog signals (such as VGA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

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

3.2.3. HDMI Connector

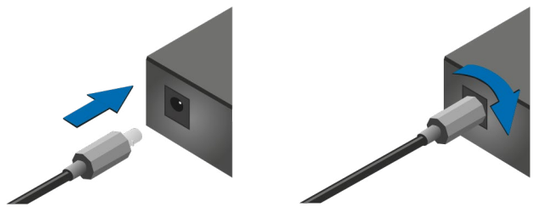
The extender provides standard 19 pole HDMI connector for input and local output. Always use high quality HDMI cables for connecting sources and displays.

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 cables for connecting DisplayPort devices.

3.2.5. 12V DC Connection



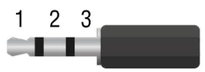
Locking DC connector

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

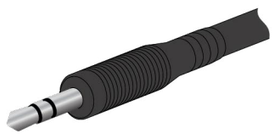
WARNING! Always use the supplied 12V power adaptor. Warranty void if damage occurs due to use of a different power source.

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 nr.	Signal
1	Left
2	Right
3	Ground



Jack audio plug pin assignments

You can find more information about the 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 nr.	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.

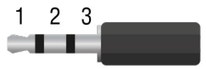
You can find more information about the RS-232 interface in the Serial Interface section.

Typical wiring examples can be found in the Cable Wiring Guide section.

3.2.8. IR Connector

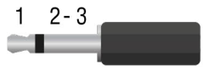
IR detector and IR emitter can be connected to the HDMI-TPS-TX100 series extenders with TRS (Tip, Ring, and Sleeve) connectors. They are also known as (3,5 mm or approx. 1/8") audio jack, phone jack, phone plug, and mini-jack plug. The pin assignments are the following for the detector and the emitter:

DETECTOR: 3-pole TRS



Pin nr.	Signal
1 Tip	Signal (active low)
2 Ring	Ground
3 Sleeve	+5V

EMITTER: 2-pole TS



Pin nr.	Signal
1 Tip	+5V
2 Ring	Signal (active low)
3 Sleeve	

IR connectors pin assingments

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

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

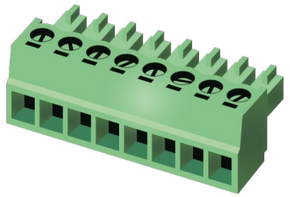
3.2.9. GPIO - General Purpose Input/Output Ports

The -TX220 models, the SW4-TPS-TX240 and TX-240-Plus transmitters contain an 8-pole Phoenix connector with seven GPIO pins that operate 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 nr.	Signal
1	Configurable
2	
3	
4	
5	
6	
7	
8	Ground



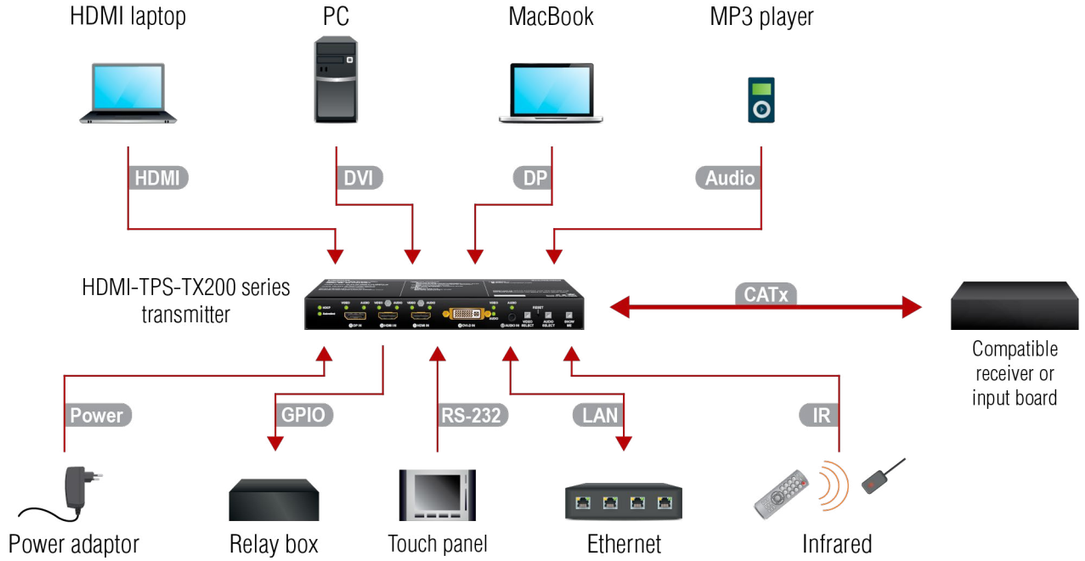
GPIO connector and plug pin assignments

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 the GPIO interface in the GPIO Interface section.

3.3. Connecting Steps



CATx Connect 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 an IR emitter to the IR OUT port of the device.
- Connect an 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.

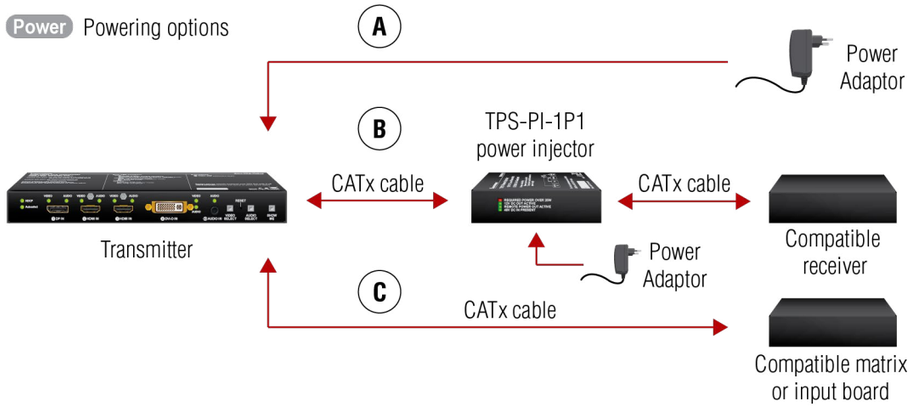
GPIO Optionally connect a controller/controlled device (e.g. relay box) to the GPIO port.

Power See powering options in the next section.

3.4. Powering Options

3.4.1. PoE-compatible Transmitters

DIFFERENCE: This section refers to the following models: HDMI-TPS-TX210 and -TX220, DVI-HDCP-TX210 and -TX220, DP-TPS-TX210 and - TX220, SW4-TPS-TX240 and TX240-Plus. HDMI-TPS-TX226 contains a different kind of remote powering feature, see the details on the following page.



A **Using local PSU**: connect the supplied power adaptor to the DC input on the transmitter first, then to the AC power socket (or use Lightware's PSU2x-series power supply unit).

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 supports PoE function.

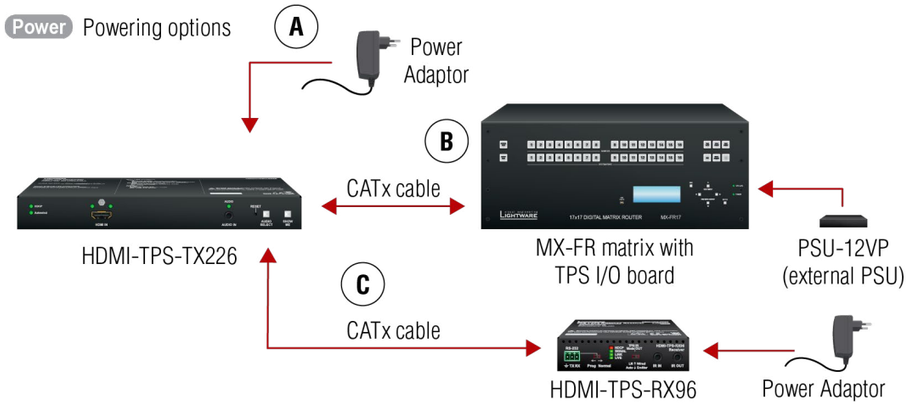
INFO: If both remote and local power sources are connected, the remote power will be used.

3.4.2. HDMI-TPS-TX226

DIFFERENCE: This section refers to the HDMI-TPS-TX226 transmitter only.

HDMI-TPS-TX226 transmitter contains a remote power feature that is not PoE-compatible. It can be used to send/receive power to/from a compatible Lightware device, see the list below:

- HDMI-TPS-RX96
- HDMI-TPS-RX95, DVI-HDCP-TPS-RX95 with proper jumper setting (see the relevant QSG)
- MX-TPS-IB, -IB-A, -IB-AS input boards (with HW v11) installed in an MX-FR matrix



A **Using local PSU**: connect the supplied power adaptor to the DC input on the transmitter first, then to the AC power socket (or use Lightware's PSU2x-series power supply unit).

B **Using Remote Power (12V over TPS) from MX-TPS-I/O board:** connect the TPS OUT port of the transmitter to a TPS input port of a matrix input port by a CATx cable. For this kind of installation you will need an external PSU connected to the board. For the detailed information, please read the user's manual of the matrix.

C **Using Remote Power (12V over TPS) from HDMI-TPS-RX96**: connect the TPS OUT (PoE) port of the transmitter to the TPS input port of the HDMI-TPS-RX96 receiver by a CATx cable.

INFO: HDMI-TPS-TX226 transmitter can be used with MX-TPS2 input boards, but only for signal transmission without sending power.

Important Notes when Remote Powering the HDMI-TPS-TX226

Cabling

- The TX and RX devices must be in the same building to **prevent ground potential difference**.
- The maximum transmission distance may be limited. Maximum recommended **cable length is 30m**.
- The CATx cable **must not be cut or crimped when it is connected** on either end, because it is under voltage.

Ground loop

- The risk of ground loop issue should be minimized by utilizing a few of our best practices.
- The CATx cable should run on a **similar path as the power lines and safety ground wire**. This is to minimize the loop span area which could catch electromagnetic disturbances.
- The connected source and sink devices at the two endpoints should have the **same Earth potential** (Equipotential earthing, safety ground).
- If the ground loop catches some electromagnetic noise and the analog audio is used on the transmitter, the noise might be added to the audio signal and **cause audible noise**. This could be fixed by using a **Di-Box** (audio balun) on the audio input, or using the **balanced audio input**. Sometimes an easy way is to ground the TX box chassis with a thick wire to the Earth potential.

4

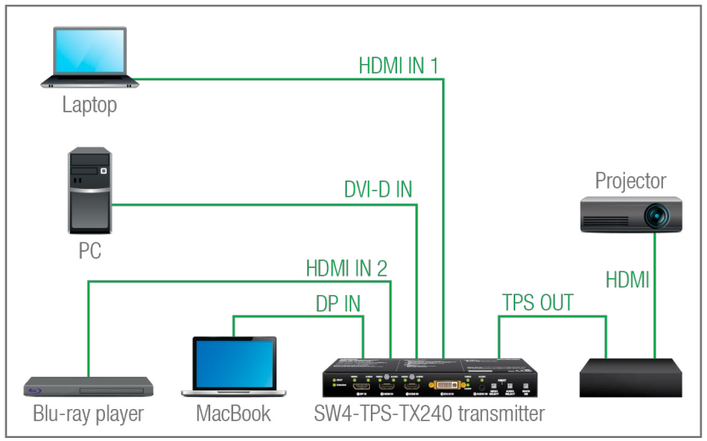
Device Concept

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.



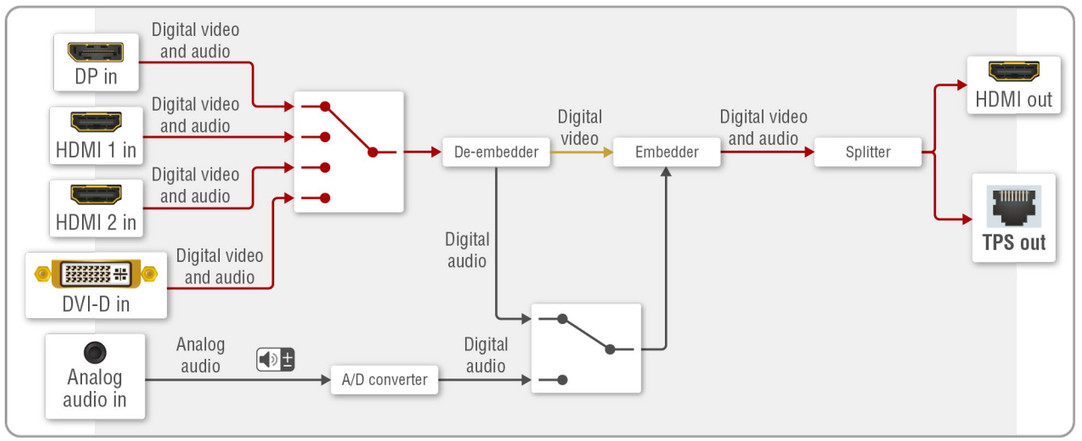
+ Ethernet
+ RS-232
+ Infrared
+ GPIO [4]

The summary of the interfaces

[1] Only for the HDMI-TPS-TX210/TX220/TX226, SW4-TPS-TX240 and TX240-Plus models.
[2] Only for the DP-TPS-TX210/TX220, SW4-TPS-TX240 and TX240-Plus models.
[3] Only for the DVI-HDCP-TPS-TX210/TX220, SW4-TPS-TX240 and TX240-Plus models.
[4] Only for the 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 shows the SW4-TPS-TX240/-TX240-Plus transmitter. The principle of the operation is the same for all models.



Port diagram of SW4-TPS-TX240 /-TX240-Plus transmitter

4.3. TPS Interface

The device is built with a TPS (Twisted Pair Single) interface that uses 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 final 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 of up to 4K.
- **Long reach**: Ideal for big distances, and 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 on the TX side, the TPS mode will be HDBaseT on both sides. If the transmitter does not transmit HDMI/DVI signal, the TPS mode will automatically be changed to LPPF2 or LPPF1. 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 the front panel Ethernet standard RJ45 connector, which is connected to the 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 the Lightware Device Updater software and perform firmware update.

4.5. Audio Interface

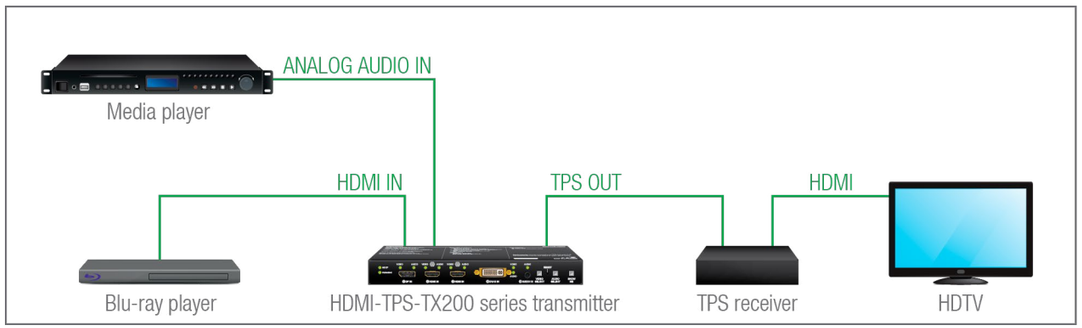
4.5.1. Audio Input Modes

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 received on the analog audio input port can be embedded into 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 AV 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**, and 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 in the following ways:

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

4.7.2. Automatic Input Selection - Example

The Concept

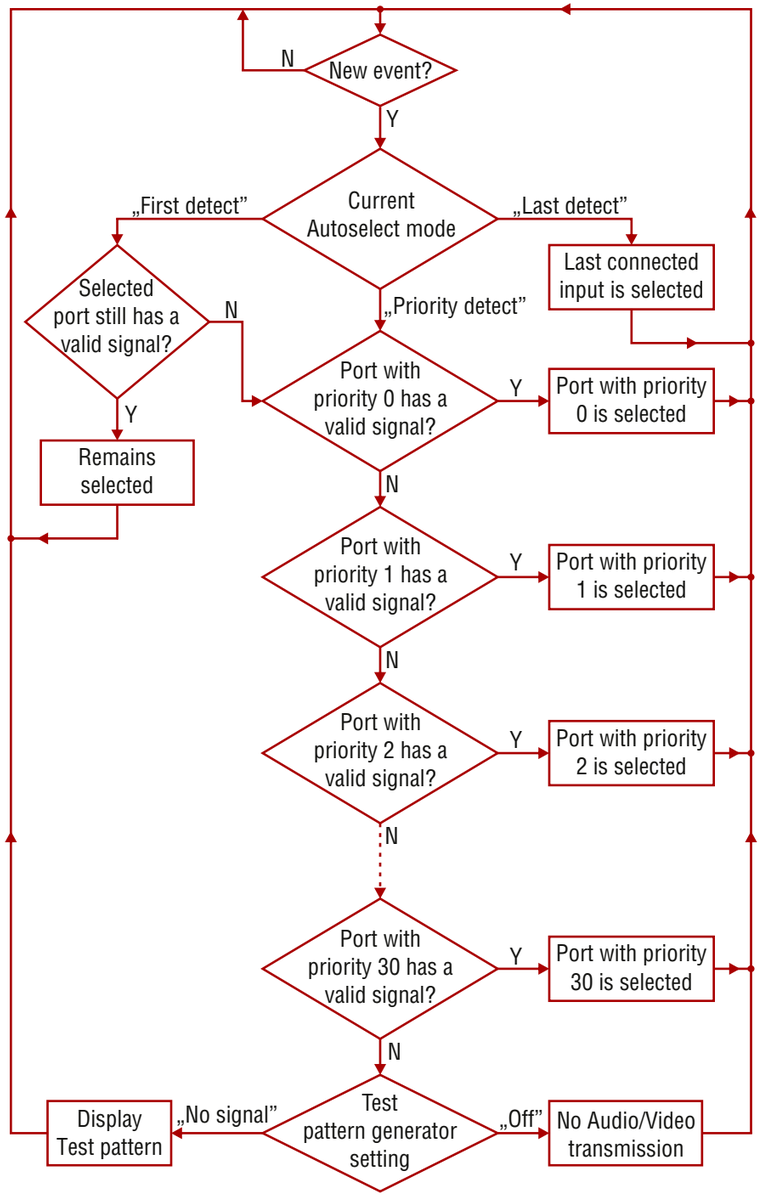
If there is no other source connected to the transmitter but the Laptop, the HDMI 1 input will be automatically switched to the TPS output. If the Laptop and the PC are also connected to the transmitter, the DVI-D input will be switched to the TPS output. If the Blu-ray player is connected on the HDMI 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 the related settings in the Audio Outputs (TPS and HDMI) section.

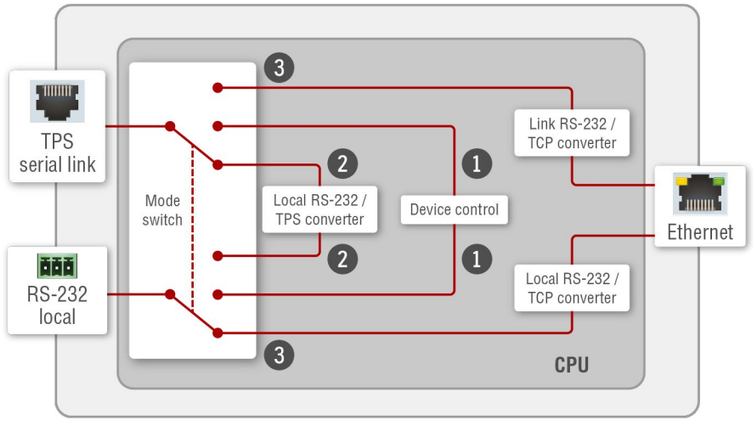


Flowchart of the Autoselection modes

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 the settings in the RS-232 section.

Only one mode can be used at the same time: Control mode, Pass-through mode, or Command Injection mode. If you choose one of them, the TPS serial link and the 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 the local RS-232 port to the TPS output port and vice versa inside the transmitter.

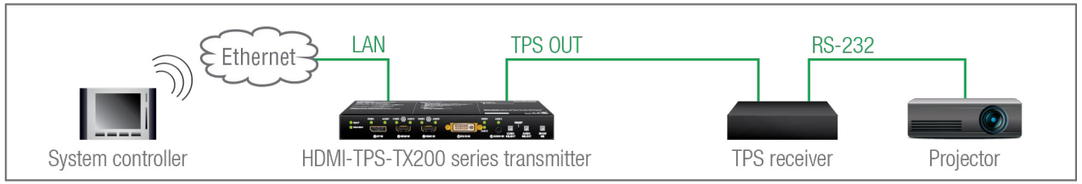
Control Mode

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 that is addressed to the port no. 8001, it will be transmitted to the Tx pin of the local RS-232 port. It also works in the opposite direction, 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) that 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

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.2.0b13.

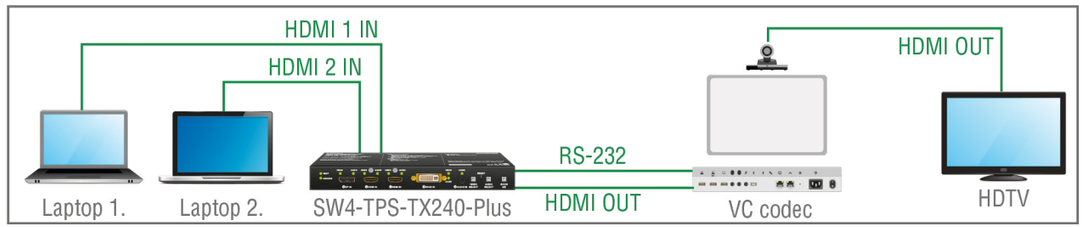
This tool is able to recognize and store the incoming RS-232 message until the previously defined string (delimiter) has arrived or the timeout has passed after the last data. The last incoming serial data is stored, and it can trigger an action in the Event Manager.

RS-232 Recognizer Example

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.2.0b13.

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 pair is set in the 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 need to be done via Lightware Device Controller Software (see the RS-232 section) or with LW3 protocol commands (see the RS-232 Message Recognizer section).

Settings in the Event manager

- **E1.** When the signal is present on the O1 port of the **SW4-TPS-TX240-Plus**, it sends a message **'PING'** on the P1 port of RS-232 to the VC codec. For more details, see the RS-232 Settings 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) 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.

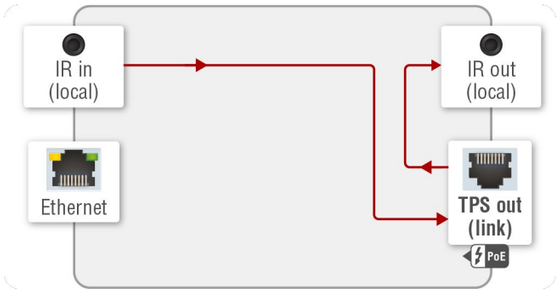
INFO: The modulation of the output IR signal can be turned on or off by an LW3 command, see the details in the Enabling/Disabling Output Signal Modulation section.

4.9.2. IR Functions

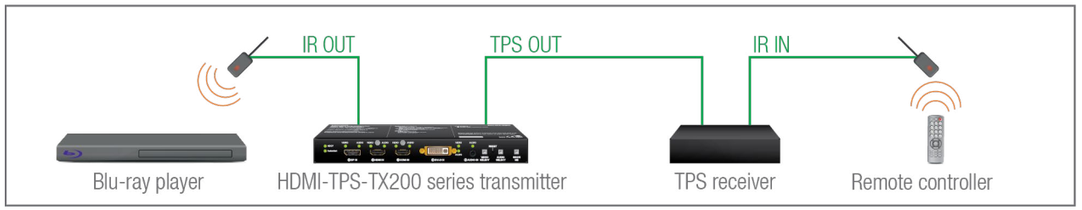
The IR functions are not separated but can be used in combination, as they are available at the same time.

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.

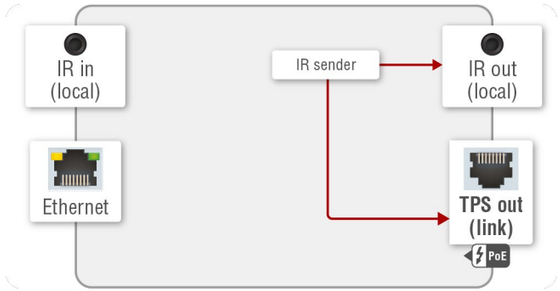
Settings

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

IR Code Sending

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.2.0b13.

Custom IR codes 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 an 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.

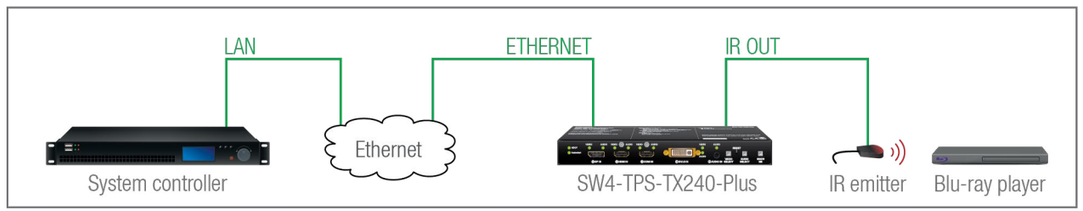
INFO: The pronto hex code that is learned by a Lightware device is **little-endian format**.

Sending IR Codes

IR codes can be sent by:

- **LW3 command**, see the Infrared Message Sending 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

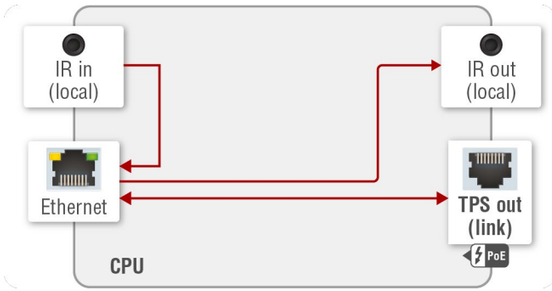
The System controller makes the transmitter send out a code over the IR output port and the IR emitter towards the Blu-ray player.

Settings

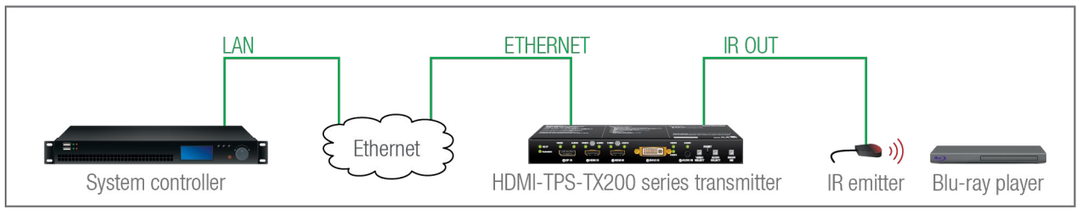
The System controller is connected to the TCP/IP port no. 6107 of the transmitter. The controller calls an LW3 method to send out the IR code over the IR output port to the IR emitter.

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 the IR code comes 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.

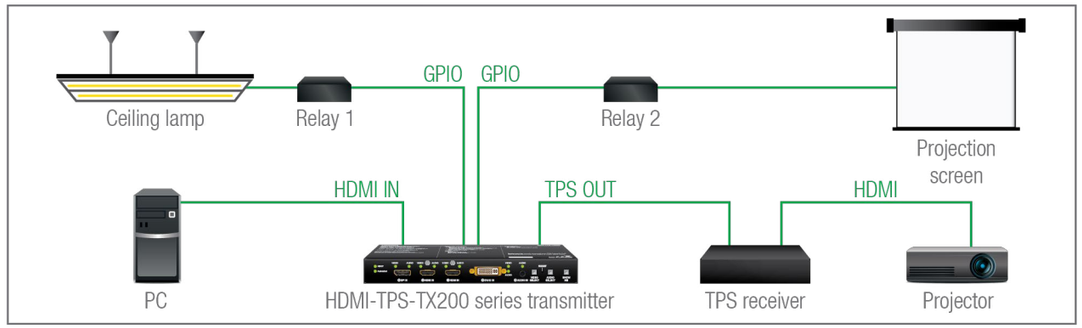
Settings

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. The direction of the seven pins is configurable independently based on needs of the application.

GPIO Options - Example



The Concept

The ceiling lamp is turned off by Relay 1 and the projection screen is rolled down by Relay 2 when signal is 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), set the GPIO pins to low level to open Relay 1. Also create another event: when signal is not present on Input 1 (I1), set the GPIO pins to high level to close Relay 1.
- **For Relay 2**: create an event in Event manager: when signal is present on Input 1 (I1), set the GPIO pins to high level to close Relay 2. Also create another event: when signal is not present on Input 1 (I1), set the GPIO pins to low level to close Relay 2.

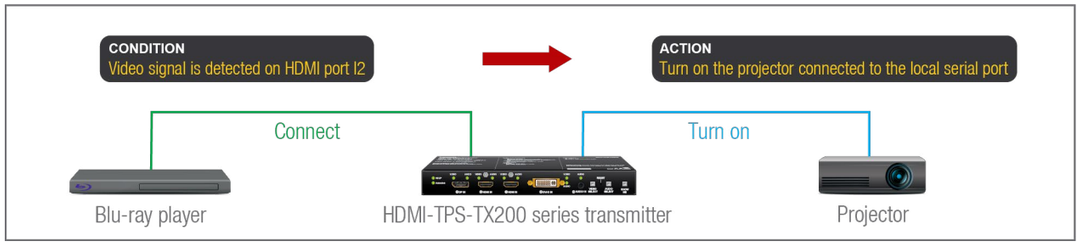
When the PC starts to play the video presentation, the signal is received over the VGA input, so the GPIO pins send a signal to Relay 1 to open, which turns off the lights. Furthermore, the GPIO pins also send a signal to Relay 2 to close, and the projection screen is rolled down. When the presentation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

ATTENTION! Please always check the electrical parameters of the devices that 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 the GPIO port in the GPIO section. See also the details about the Event Manager settings in the Event Manager section.

4.11. The Event Manager Feature

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.

Event Manager +

The AND Operator

DIFFERENCE: This feature is available from FW package v1.3.0b6.

The practical experience has shown that there is a need to examine more conditions (up to four) as follows: if one of the set conditions becomes true (while the other conditions are fulfilled), then the set Action is launched. For example, in a meeting room we have the following situation:

- Signal is present on an input port,
- A GPIO pin state becomes 'low' (by an external device).

If the two **Conditions** are present at the same time, the **Action** is launched. Just create the two **Conditions** into separate Events, then create a third Event, select the two **Conditions** and define the **Action**.

See the Combine Links section for the settings in LDC.

Event Manager Variables

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

A brand new area is opened by implementing the variables. You can create custom variables in number or text format, which can be used in the Event Manager. The variables can have the following properties/methods:

- Numeric (integer) type with min/max value setting, or string-type (determined automatically)
- Increment/step the numeric value,
- Value-dependent case operations,
- Reading and storing the value of an LW3 property into a string or a numeric variable.

The defined variables are stored in a non-volatile memory and the value is kept in case of a reboot. The new opportunities allow creating a monitoring/controlling system without connecting an additional control processor.

See the Variables section for the settings in LDC.

Condition Trigger

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

This improvement in the Event Manager works as if a condition is detected. When a complex control system is built, a Condition may trigger numerous Actions. A typical example is when a system is powered on and the 'ready-to-use' state has to be loaded. In this case, there could be many actions that are based on the same condition. In order to reduce the number of the commands, you can trigger one 'key' condition, which could start the whole process.

See the Condition Triggering section for the settings in LDC.

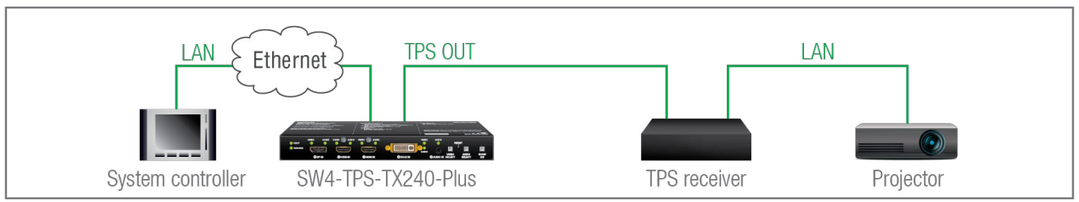
4.12. Ethernet Interface

The device can be controlled over the Ethernet port. This interface supports both LW2 and LW3 protocols.

4.12.1. Device Control over Ethernet

The interface can also be used to remote control a third-party device and establish the connection to the Lightware Device Updater software and perform firmware update.

Third-party Device Control via Local Ethernet (Example)



The following ways are available for device control:

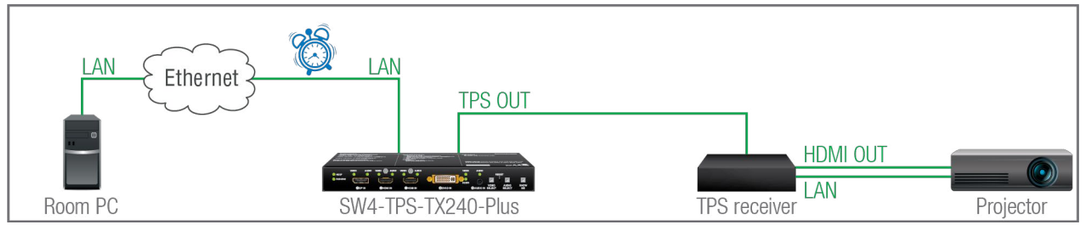
- The **system controller** can communicate with the **transmitter** via Ethernet using LW2/LW3 protocol commands.
- Since the Ethernet is sent over TPS, the **system controller** can communicate with the **projector** by its IP:port address.
- The **transmitter** can send commands (e.g. as an action by the Event Manager) to the IP:port address of the **projector** by using LW3 protocol commands. See Event Manager usage in the Event Manager section, and find the related LW3 protocol commands in the Ethernet Message Sending section.

4.12.2. Wake-on-Lan

DIFFERENCE: This feature is available from FW package v1.3.0b6.

The well-known wake-on-lan feature (sending a magic Packet to the target PC) is available. This can be used to power on a computer automatically: just send a simple LW3 command, see the Powering on a Computer over Ethernet (Wake-on-LAN) section.

INFO: Please make sure the feature is enabled in the target PC and it is powered (but switched off).



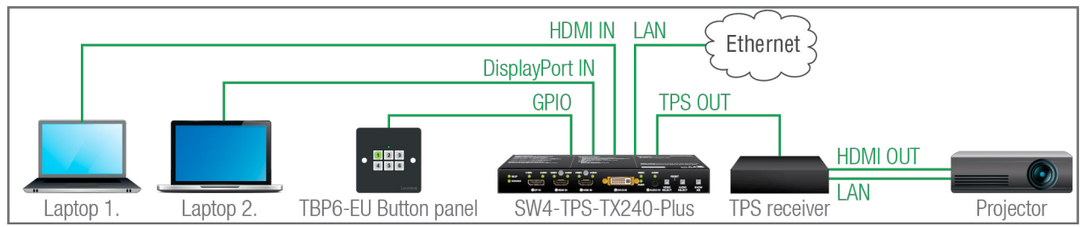
4.12.3. TCP Recognizer

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6

The feature is almost the same as in case of the RS-232, but for the network interface: the incoming TCP messages can be processed, which may trigger actions. The combination of the TCP recognizer and the Event Manager gives numerous opportunities for creating automatic room solutions.

TCP Recognizer Example

When the Projector switches off, the button light (1) of the TBP6-EU button panel is turned off automatically.



When the power-off process is started in the projector, it will send a message over Ethernet. That message will be recognized by the **Transmitter** and will be used as a Condition in Event Manager.

How to setup the switcher?

Step 1. Configure the recognizer for the communication by the LDC, (see the TCP Clients (TCP Message Recognizer) section) or by LW3 protocol commands (see the TCP Message Recognizer section). Define the desired device as a TCP client. (The Projector is saved as 'C1' in this example.)

Step 2. Create the following event in the Event manager:
E1. When the `(PWR!001 "On")` message is recognized from the C1 client, the GPIO pin 1 is set to low level.

For more information about setting the events in LDC, see the Event Manager section.

4.13. Basic IT Security

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

These entry-level network security improvements help prevent unauthorized access to the Lightware device:

- **Cleartext login**
- **IP Port Block**
- **MAC Filtering**

The **Cleartext Login** tool allows setting a password for login, thus the device will not accept any command coming from an interface (RS-232, Ethernet, etc...), only the device type and the serial number can be queried without login. You can set all affected TCP/IP ports individually to enable or disable.

The **IP Port Block** feature is an additional protection for the Cleartext login. There are TCP/IP ports in Lightware devices that are not protected by the login, so you can disable them if necessary. Example: due to the working method of the LW2 communication, the Cleartext login does not provide protection when an LW2 command is sent to the device, that is why the TCP port no.10001 shall be blocked manually.

Another level of security is the **MAC Filtering** tool. You can create an 'allowlist' of network devices based on the MAC address that are allowed:

- Controlling the device (Send option), or
- Querying parameters (Receive option) to/from the Lightware device.

The table below shows the protection levels of these features.

IP Port	Function	MAC Filter	Cleartext Login	IP Port Block
80	HTTP Post&Get	✔	-	✔
81	LW3 control (miniweb)	✔	✔	-
6107	LW3 protocol	✔	✔	-
800x	Command injection (RS-232)	✔	-	✔
900x	Command injection (IR)	✔	-	✔
10001	LW2 protocol	✔	-	✔

ATTENTION! Be careful when combining these functions; improper settings may cause malfunction.

Most of these features are available in LDC, see the Settings Menu section.

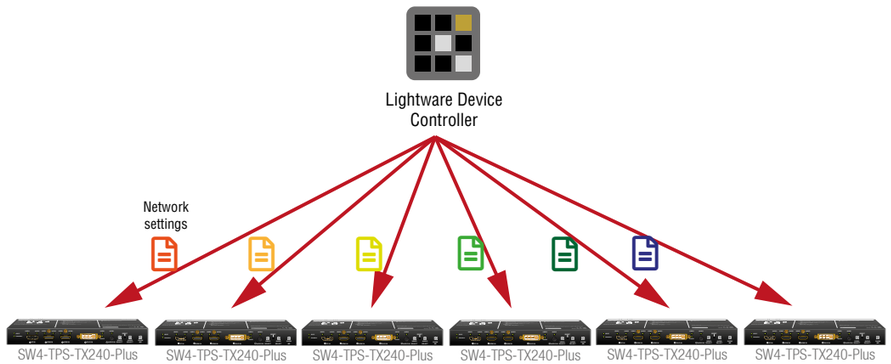
4.14. Bulk Device Management

It is possible to configure several devices at once with the Bulk Device Management tool. This feature can be accessed by clicking on the **Tools** button in the bottom left corner of the Device Discovery window of the LDC and choosing the Bulk Management option. *#new*

See the Bulk Device Management section for more details.

4.14.1. Network Settings

This function makes it possible to change and adjust the network settings of several devices at once (unique settings for each device), without having to set them at each device one by one. A .csv file can be created containing the list and desired settings of the devices and it can be uploaded into the LDC to be applied to the devices quickly.



4.15. Batch Commands

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

These features can be used to process a group of pre-defined commands. The commands can be stored in the device as macros or you can save the commands in a plain text file and send it to the device by an HTTP message.

LW3 over HTTP (Command Salvo)

This feature allows the LW device to be controlled over HTTP. In this case, a batch of commands is sent over HTTP to the Lightware device for processing. Save the LW3 commands into a file, post it to the <IP_address>/protocol.lw3 file and the commands are processed immediately.

Running Macros

In this case, the command sequences (macros) are stored in the device. You can create your custom macros in a file, upload them into the device and run at any time. The number of the macros depends on the device type, at most 50 macros can be saved. See more information about the feature in the Macros section.

4.16. Further Built-in Features

4.16.1. 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 Configuration Cloning (Backup Tab) section.

Configuration cloning can also be done by LDU2 over Command Line for many devices in one step, see the Restore section.

4.16.2. Remote Firmware Update of Connected Lightware Devices

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

ATTENTION! Please note that the minimum system requirement is 1 GB RAMand the minimum display resolution shall be 1280x720.

ATTENTION! Certain ports are used for the communication in the background; please check the list in the Applied Ports (Network Settings) section.

INFO: After the installation, the Windows and the Mac applications have the same look and functionality. This type of the installer is equal to the Normal install in case of Windows and results in 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

ATTENTION! Please check the firewall settings on the macOS device. LDC needs to be added to the exeptions of the blocked software for the proper operation.

Mount the DMG file by 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.

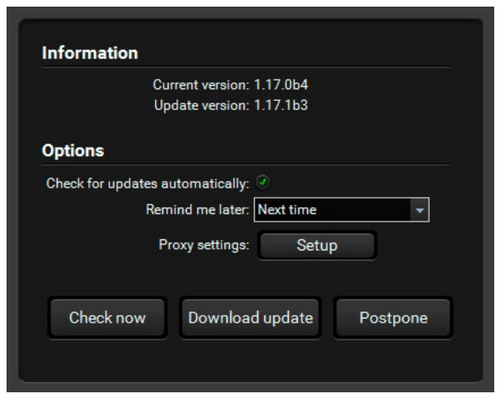
Updating of LDC

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 LDC updates are found.

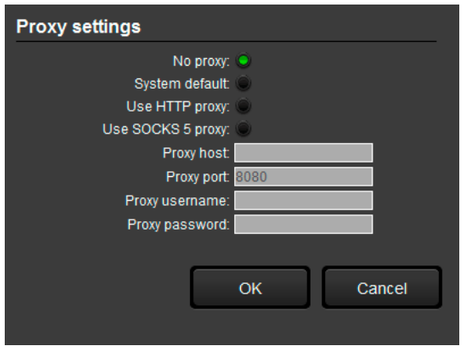
The current and the update version number can be seen at the top of the window, and they are shown in this window even with the snapshot install.

The **Update** window can also be opened by clicking on 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 updates automatically, uncheck **the circle** that 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 on the **OK** button.

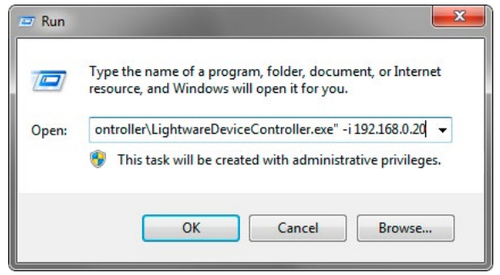


Step 3. Click on the **Download update** button to start the updating.

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

5.2. Running the LDC

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



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`

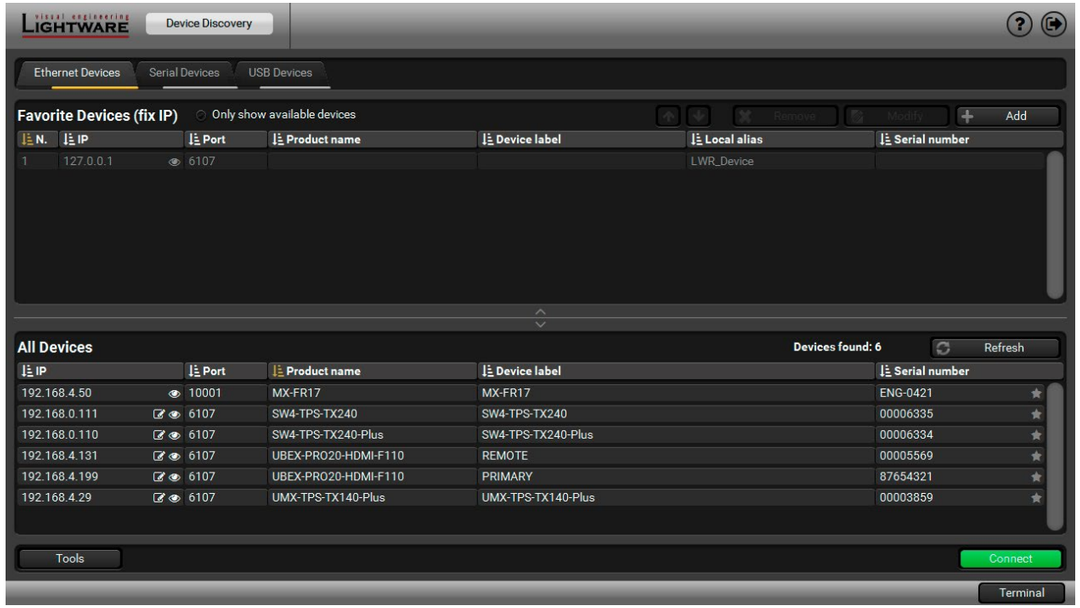
ATTENTION! The last set value is stored and applied when LDC is started without a parameter.

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. There are three tabs for the different type of interfaces; Ethernet and Serial are available for TPS-TX200 devices.

Step 3. Select the desired unit and click on the green **Connect** button (or just double-click on the device).



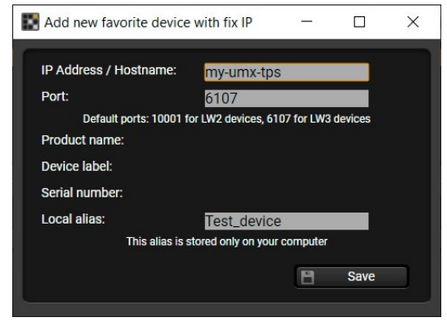
Device discovery window in LDC

5.3.1. Ethernet Tab

The Ethernet tab consists of two lists. The **All devices** list contains all Lightware devices that are available in the connected network (in the 255.255.0.0 subnet). However, there is no need to browse all the available devices, as you can expand the list of **Favorite devices** with any Lightware device that is connected via Ethernet in any of the following ways:

- Mark the desired device with the ★ symbol in the **All Devices** list,
- Press the **Add** button and add the device in the appearing window, or
- **Import** the list of favorite devices that was **exported** previously.

Add New Favorite Device



Press the **Add** button; in the appearing window you can enter the **IP address**. The **hostname** of the desired device can be used instead, if it is supported. That allows setting a unique name to identify the device in a network. If the host name is saved in this window and the IP address is changing, the device will still be available and connectible.

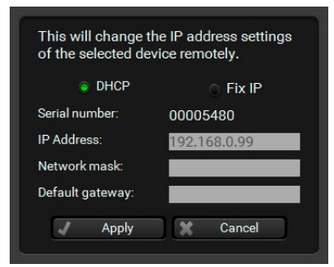
> **ATTENTION!** The host name connection-feature does not work when the target device is accessed over VPN.

See more information about the host name property in the Setting the Host Name section.

Import/Export the List of Favorite Devices

The list of favorite devices can be exported/imported by the dedicated buttons (saved as *.JSON file). The list can be imported later (in another computer, too), but please note that the current list will be overwritten by the imported list.

Changing the IP Address



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

You can see the new settings only in this window. The device needs a few seconds to apply the new settings.

Identifying the Device

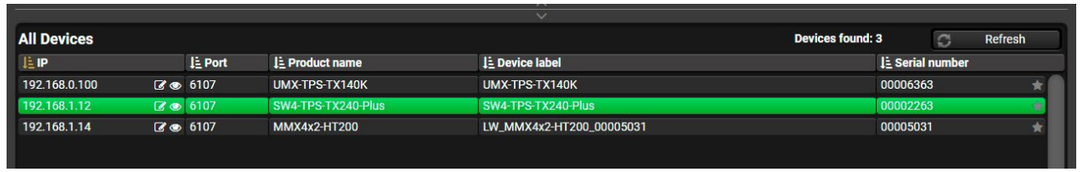
Clicking on the icon results the blinking of the status LEDs for 10 seconds. The feature helps find the device itself physically.

#identifyme

Highlighting the Device

DIFFERENCE: This feature is available only from FW package v1.3.0b6.

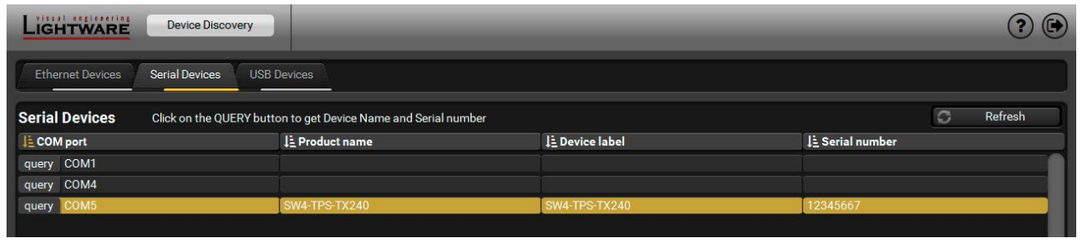
The opposite feature is also available to help find the desired device. Press the **Show Me** button for **5 seconds,** until the front panel LEDs start to blink slowly. In parallel, the device is **highlighted in green for 4 seconds** in the Device discovery window of the LDC. *#highlightme*



INFO: "Highlight Me" is the default function of the **Show Me** button. If you assign a different function to the button, the feature above will not be available.

5.3.2. Serial Tab

If the device is connected via the RS-232 port, click on the **Query** button next to the desired serial port to display the device's name and serial number. Double-click on the device or select it and click on the green **Connect** button.



ATTENTION! Before the device is connected via the local RS-232 port, make sure that the **Control mode** and **LW3 protocol** are set on the serial port. Furthermore, the RS-232 port must be free and other serial connection must not be established to the device over that port.

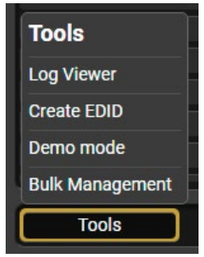
5.3.3. Further Tools

The **Tools** menu contains the following options:

- **Log Viewer:** The tool can be used for reviewing log files that have been saved previously.
- **Create EDID:** This tool opens the Easy EDID Creator wizard, which can be used for creating unique EDIDs in a few simple steps. Functionality is the same as the Easy EDID Creator.
- **Demo Mode:** This is a virtual MX-FR17 matrix router with full functionality built into the LDC. Functions and options are the same as that of a real MX-FR17 device.
- **Bulk Management**: This tool allows changing the network settings of several devices at once. See the details in the next section.

The **Terminal** window is also available by pressing its button on the bottom.

5.4. Bulk Device Management



It is possible to configure several devices at once with the Bulk Device Management tool. This feature can be accessed by clicking on the Tools button in the bottom left corner of the Device Discovery window and choosing the Bulk Management option.

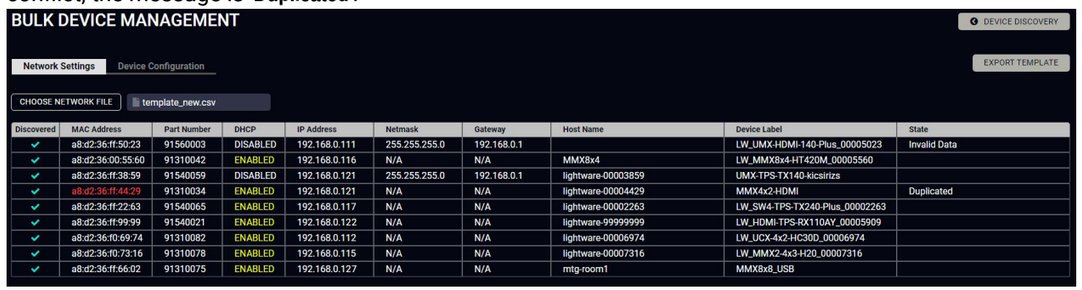
#new

DIFFERENCE: This function is available from the firmware version v2.6.0b6 of the LDC and v1.3.6b2 of the HDMI-TPS-TX200 series devices.

5.4.1. Network Settings

It is possible to set the network settings of several devices at once by using a .csv file that contains the list of the devices that we need to configure, then uploading it into the LDC.

Please note that if the data in the file is missing or incorrect, then the discovery of the affected device will fail and an '**Invalid data**' message will be displayed in the State column. In case of an IP or MAC address conflict, the message is '**Duplicated**'.



MACADDRESS	PARTNUMBER	DHCP	IP	NETMASK	GATEWAY	HOSTNAME	DEVICELABEL
a8:d2:36:ff:50:23	91560003	DISABLED	192.168.0.111	255.255.255.0	192.168.0.1	lightware-00005023	LW_UMX-HDMI-140-Plus_00005023
a8:d2:36:00:55:60	91310042	ENABLED	192.168.0.116	255.255.255.0	192.168.0.1	MMX8x4	LW_MMX8x4-HT420M_00005560
a8:d2:36:ff:38:59	91540059	DISABLED	192.168.0.121	255.255.255.0	192.168.0.1	lightware-00003859	UMX-TPS-TX140-kicsirizs
a8:d2:36:ff:44:29	91310034	ENABLED	192.168.0.120	255.255.255.0	192.168.0.1	lightware-00004429	MMX4x2-HDMI
a8:d2:36:ff:22:63	91540065	ENABLED	192.168.0.117	255.255.255.0	192.168.0.1	lightware-00002263	LW_SW4-TPS-TX240-Plus_00002263
a8:d2:36:ff:99:99	91540021	ENABLED	192.168.0.122	255.255.255.0	192.168.0.1	lightware-99999999	LW_HDMI-TPS-RX110AY_00005909
a8:d2:36:f0:69:74	91310082	ENABLED	192.168.0.112	255.255.255.0	192.168.0.1	lightware-00006974	LW_UCX-4x2-HC30D_00006974
a8:d2:36:f0:73:16	91310078	ENABLED	192.168.0.115	255.255.255.0	192.168.0.1	lightware-00007316	LW_MMX2-4x3-H20_00007316
a8:d2:36:ff:66:02	91310075	ENABLED	192.168.0.127	255.255.255.0	192.168.0.1	mtg-room1	MMX8x8_USB

Changing the network settings can be done in a few easy steps:

Step 1. First alter the settings you need to change in the .csv file that contains the devices. You can use a template file accessible via the **Export template** button and saving the file to your computer, then filling it out with the parameters of the devices. The file contains the MAC address, Partnumber, DHCP status, IP address, Netmask, Gateway, Hostname and Device label of each device.

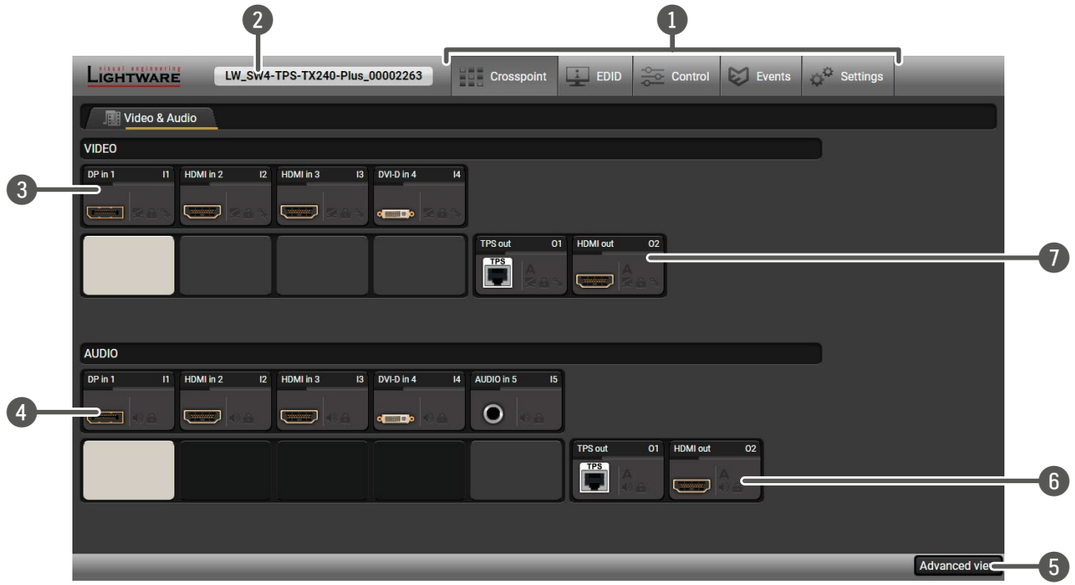
Step 2. Upload the .csv file into the LDC by pressing the **Choose network file** button and browsing the file in the pop-up window. This will result in a list of the devices appearing on the screen.

Step 3. Finally, press the **Apply settings** button to execute the changes. This might take up to a minute to finish.

Message	DHCP enabled	DHCP disabled	Device discovered
All Done	Successful procedure		✓
Partly Done	Failure setting the Host name and/or the Device label		✗
Unavailable device	Host name **and** Device label missing	IP address, Network, **and/or** Gateway missing	✗
Failed	Host name **and** Device label incorrect	IP address, Network **and** Gateway incorrect	✓
IP mismatch	-	Host name **and** Device label incorrect	✗

ATTENTION! The '**Failed**' and '**IP mismatch**' status indicators are not common, they appear when the multicast and/or the port used for LMDMP connection is disabled, or if the firmware version of the device is below the recommended (see the pop-up window when opening the Bulk Management or the beginning of this chapter).

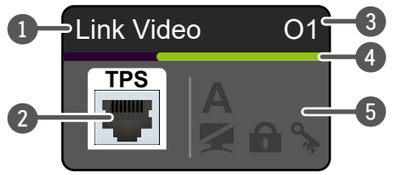
5.5. Crosspoint Menu



1	**Main menu**	The available menu items are displayed. The active one is showed with a 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 be embedded into 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 symbol
3. Port number
4. Signal present indicator
   green: present
   grey: not present
5. State indicators

State Indicators

The 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

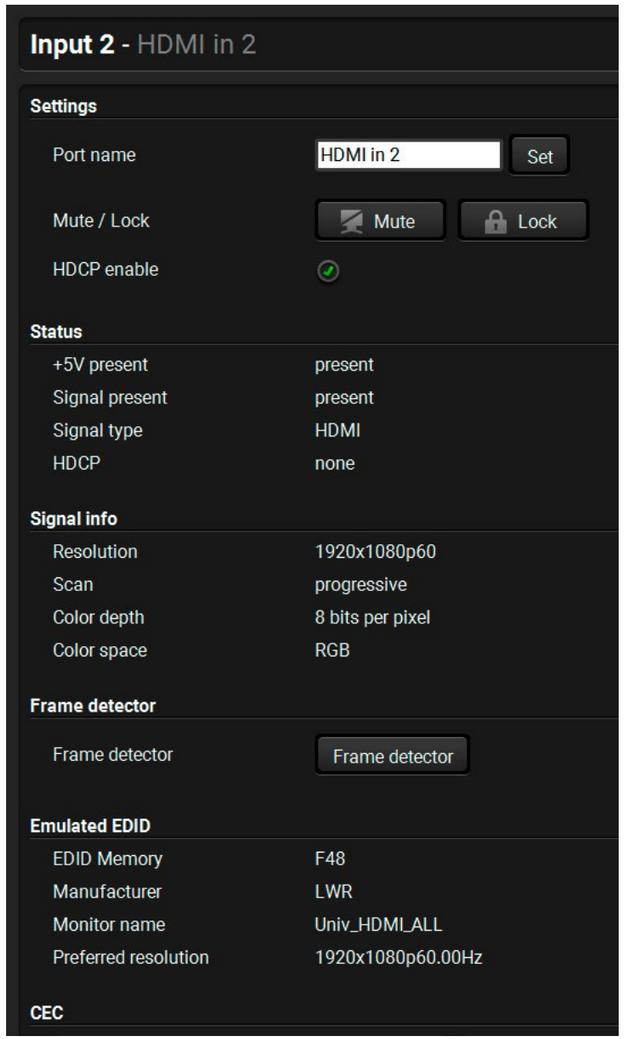
TIPS AND TRICKS: Hover the mouse cursor over the information ribbon; the product name and the IP address of the device will appear as a tooltip text.

#label #devicelabel

5.6. Port Properties Windows

5.6.1. Digital Video Inputs

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



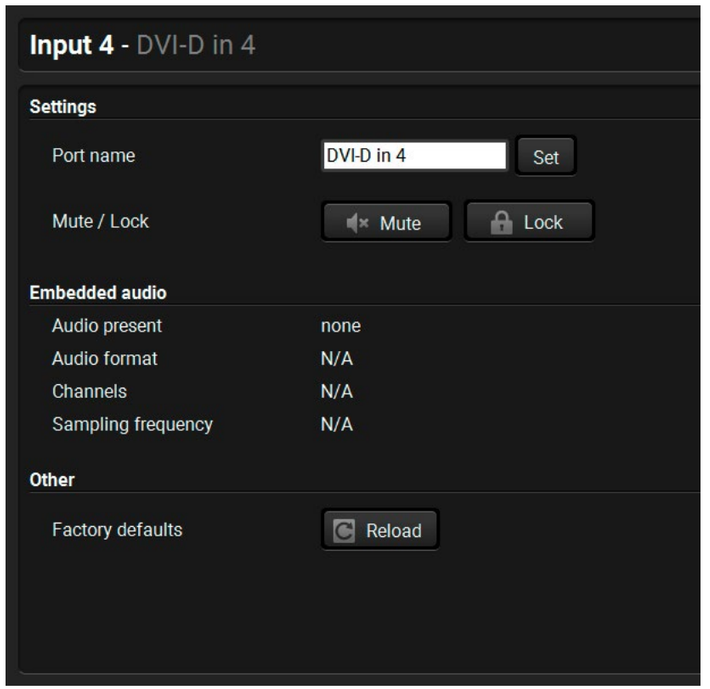
Port Properties Window of an HDMI input

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.
- Reload factory default settings for the selected port.

5.6.2. Digital Audio Inputs

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

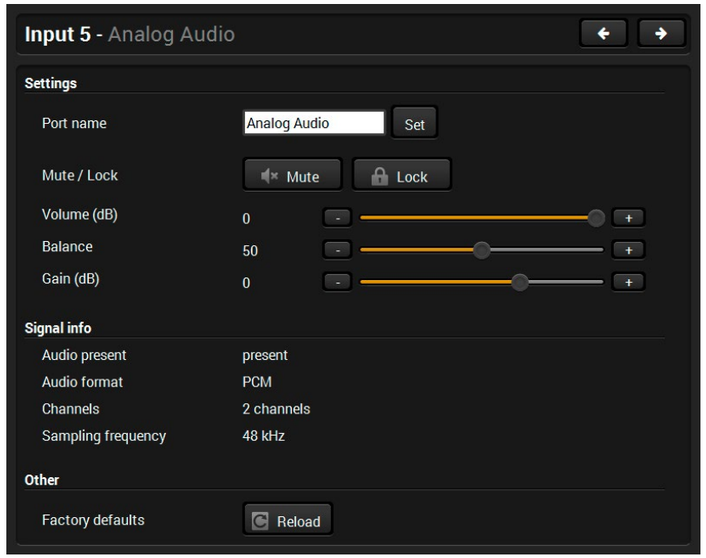


Port properties window of the DVI-D audio input

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.
- Reload factory default settings for the selected port.

5.6.3. Analog Audio Input



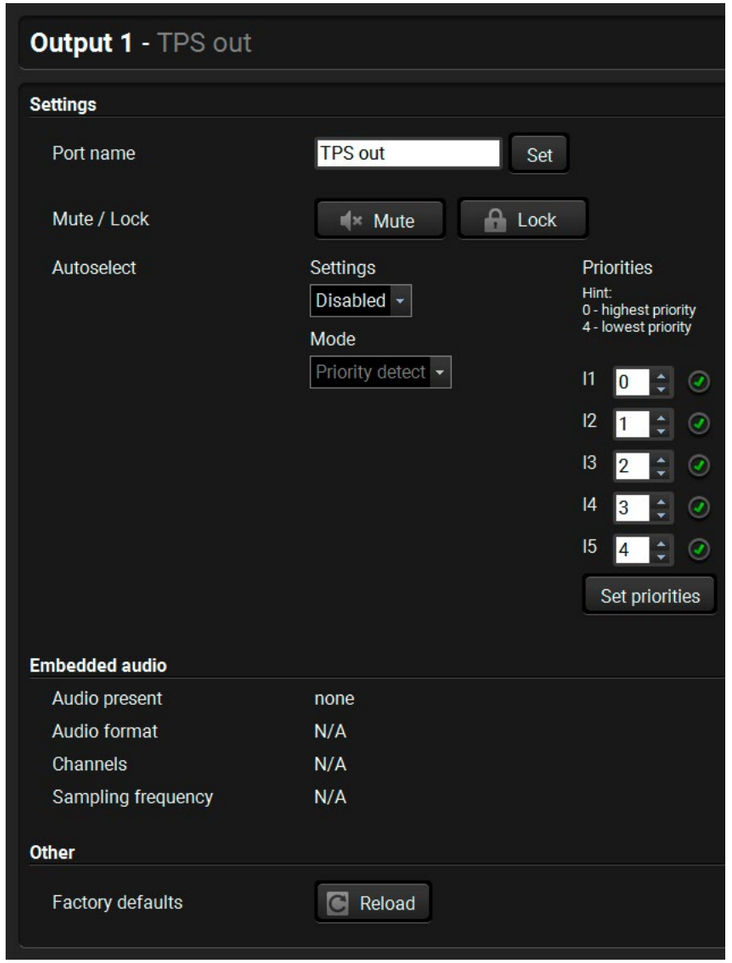
Port properties window of the Analog Audio (Jack) input

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).
- Reload factory default settings for the selected port.

 # #analogaudio #balance #volume

5.6.4. Audio Outputs (TPS and HDMI)

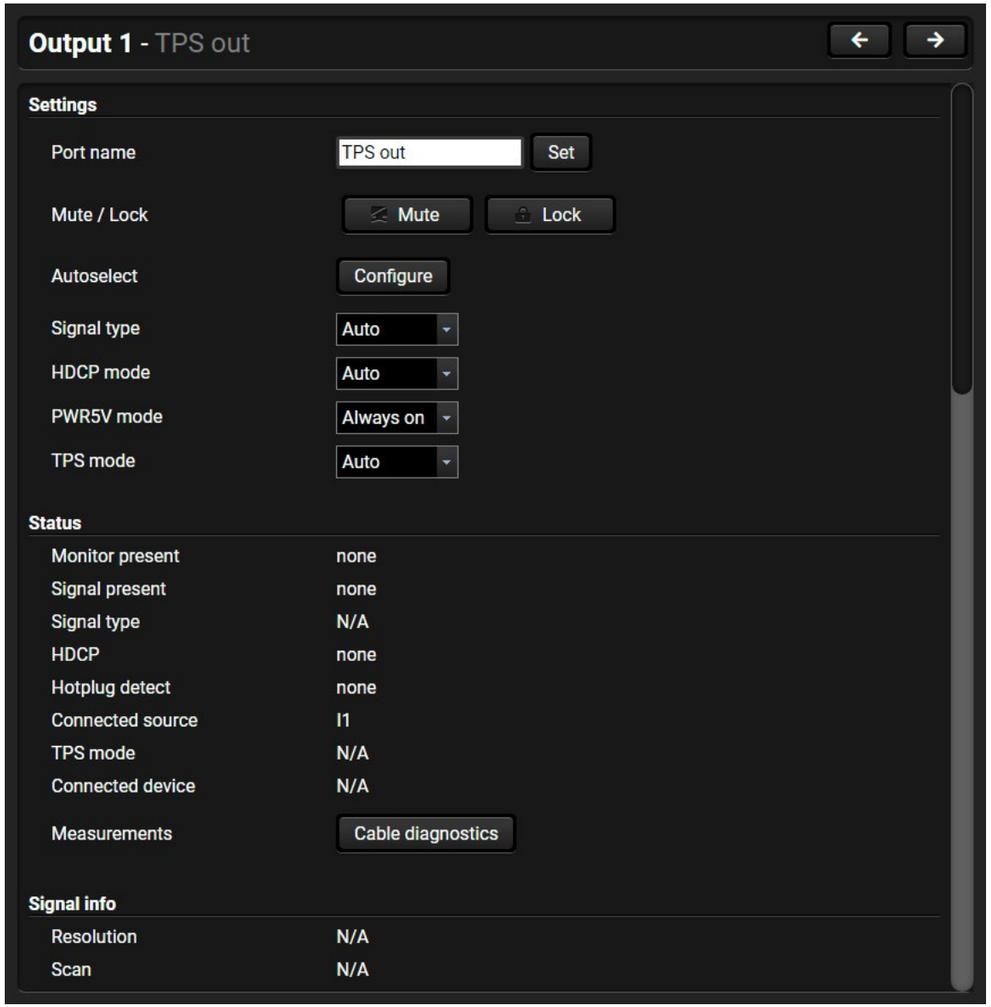


Port Properties Window of the TPS Audio Output

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 the Autoselect feature in The Autoselect Feature section).
- Reload factory default settings for the selected port.

5.6.5. 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 the Autoselect feature in The Autoselect Feature section). *#signaltype*
- **Signal type**: Auto / DVI / HDMI - The outgoing signal format can be selected from 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*
- **Connected source**
- **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.
- Reload factory default settings for the selected port.

5.7. CEC Tool

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.2.0b13.

INFO: According to the standard, the CEC feature works only at HDMI ports.

The SW4-TPS-TX240-Plus model is able to send and receive Consumer Electronics Control (CEC) commands. This feature is for remote control of 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 send 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 send 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 sent CEC commands (in red) and 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 refusal stands after the '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 quick and easy management of CEC commands. These buttons are pre-programmed with basic functions and send commands towards the sink. The communication is displayed in the Received Command box. For the list of the commands, see the CEC Command Sending 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.

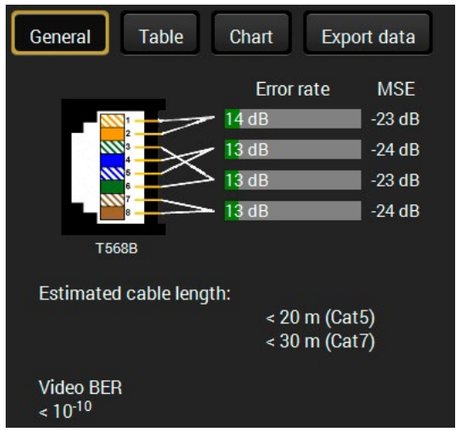
INFO: The first 2x2 bit of the CEC commands contains identification data of the source and destination address. In this case that is always 40.

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

5.8. Diagnostic Tools

5.8.1. 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 errors during the extension is higher than what is generally deemed acceptable. The link might be alive, but recovering 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

The Video Bit Error Ratio (BER) displayed above 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 the Maximum Extension Distances section.

Table and Chart Views

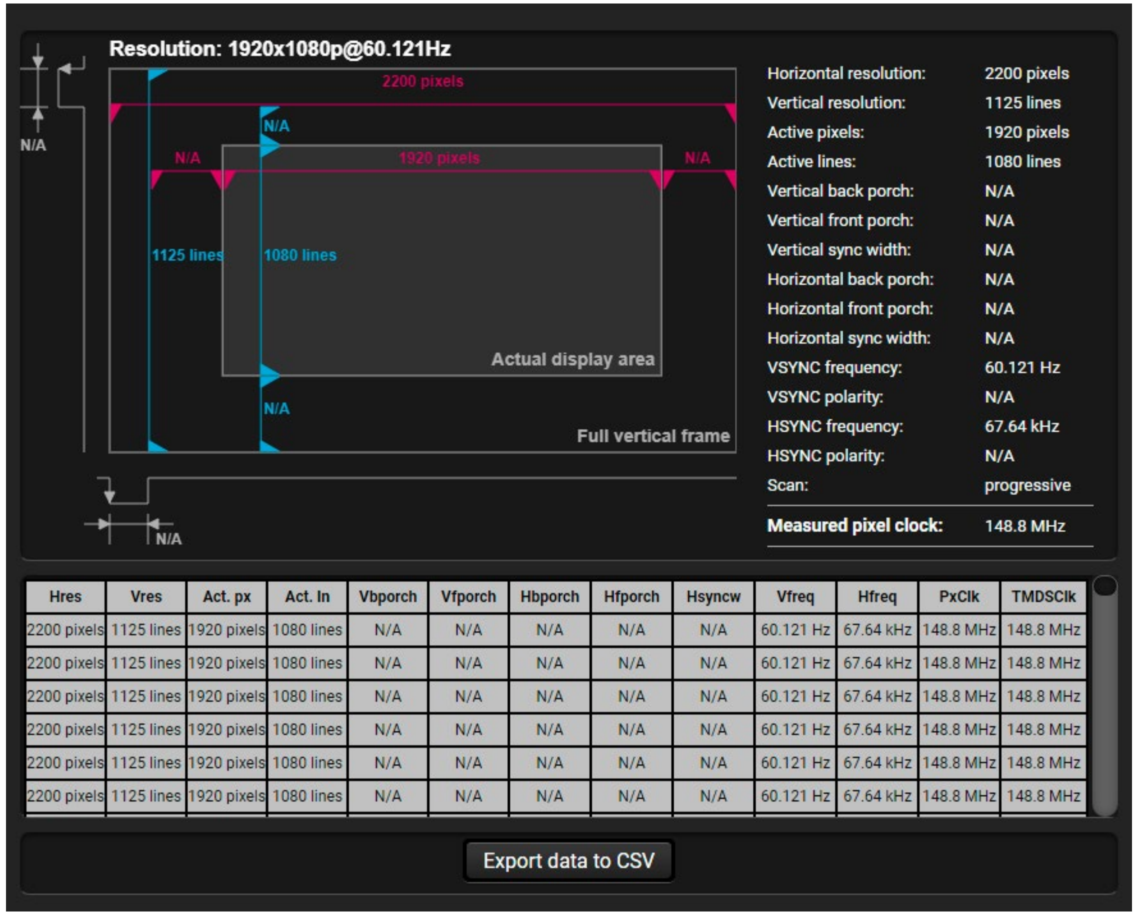
Cable diagnostics can be displayed in advanced modes as well. Two ways are available: **table view** and **chart view**. Data can be exported to a file by clicking on the **Export data** button.

Table view of cable diagnostics

Chart view of cable diagnostics

5.8.2. 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 the **Frame detector** button. *#framedetector*

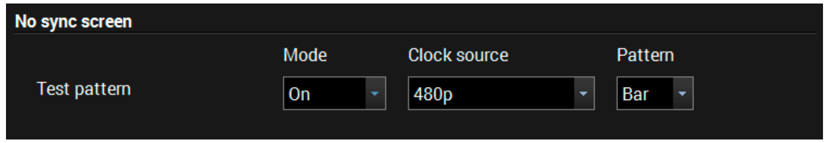


Frame detector window

Lightware's Frame Detector function works like a signal analyzer and makes it possible to determine the exact video format that is present on the port, thus helps 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 easier to use. The actual display area shows the active video size (light grey). The dark grey area of the full frame is the blanking interval, which can contain the info frames and embedded audio data for HDMI signals. The shown values are measured directly on the signal and not retrieved only from the HDMI info frames.

5.8.3. 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 that can be displayed when there is no incoming signal on the port. The following settings can be set for the Test Pattern function:

Mode

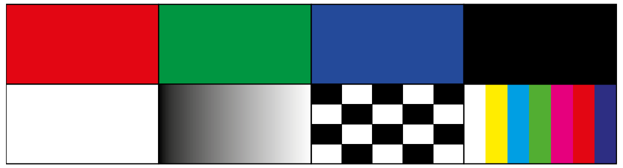
- **On**: the video output port always transmits the test pattern.
- **No signal**: the video output port transmits the test pattern if there is no incoming signal on the selected input port.
- **Off**: the test pattern function is disabled, the video output port transmits the video signal of the selected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

Clock Source

- 480p
- 576p
- Original video signal

Pattern

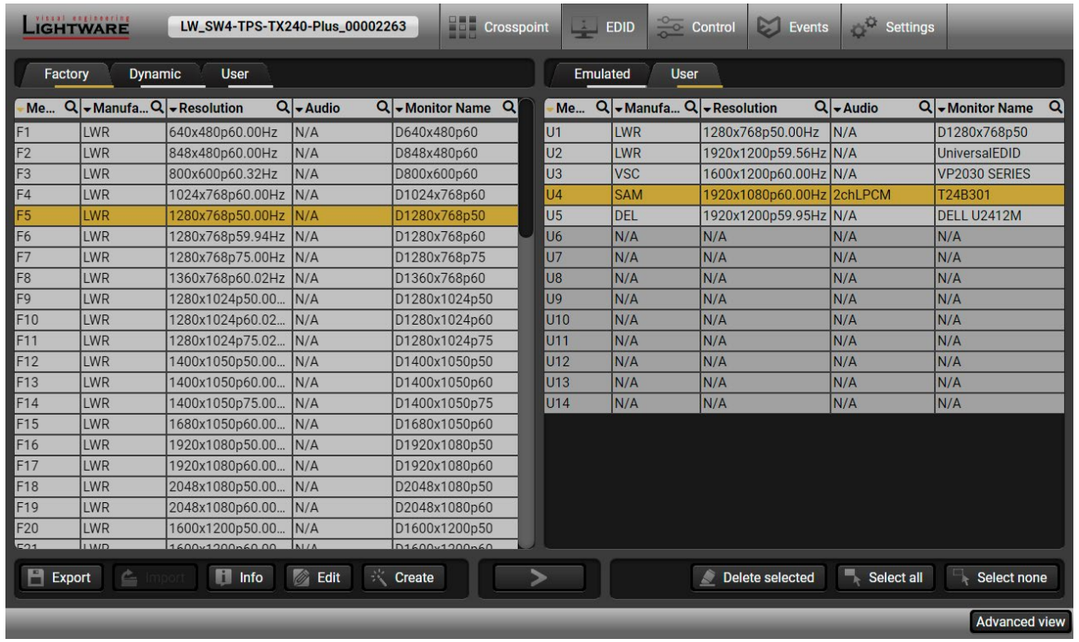
- Red / Green / Blue / Black / White / Ramp / Chess / Bar / Cycle



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

5.9. EDID Menu

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



EDID menu

5.9.1. 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 last connected to each output port, 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.

5.9.2. 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 in yellow.

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

The 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 in yellow).

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

Importing an EDID

A 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. The 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:

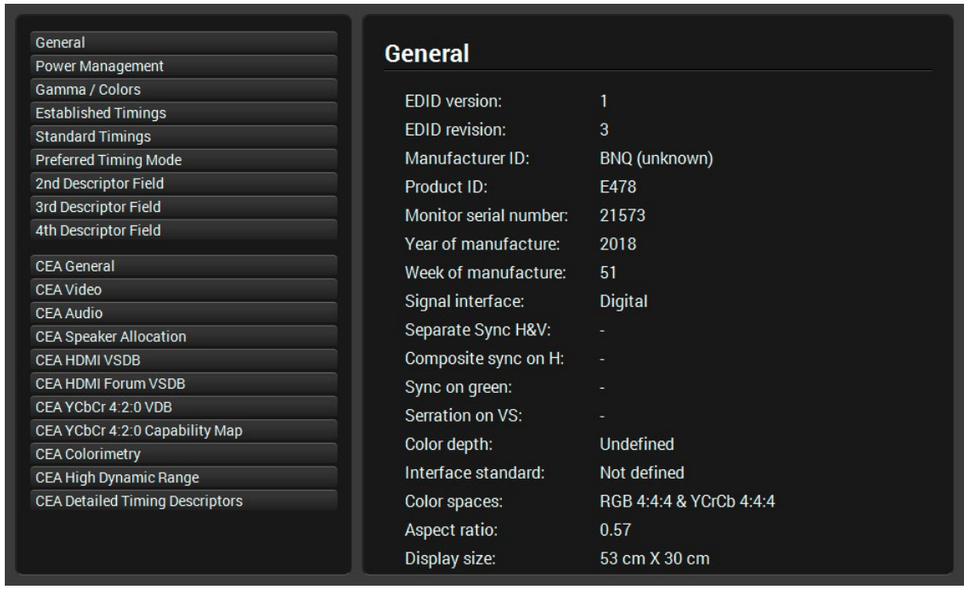
Step 1. Press the **User** button on the top of the Destination panel.

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 in yellow.

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

5.9.3. EDID Summary Window

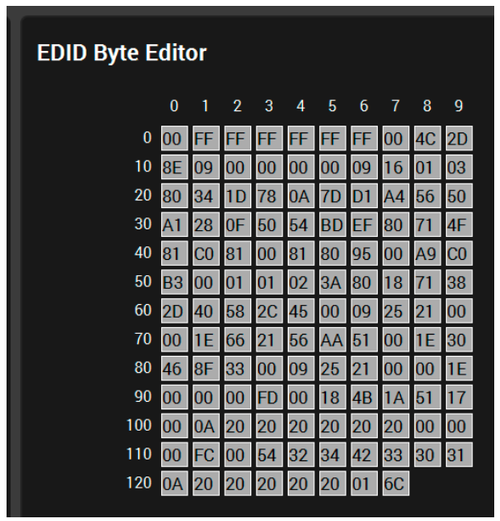
Select an EDID from Source panel and press the **Info** button to display the EDID summary.



EDID summary window

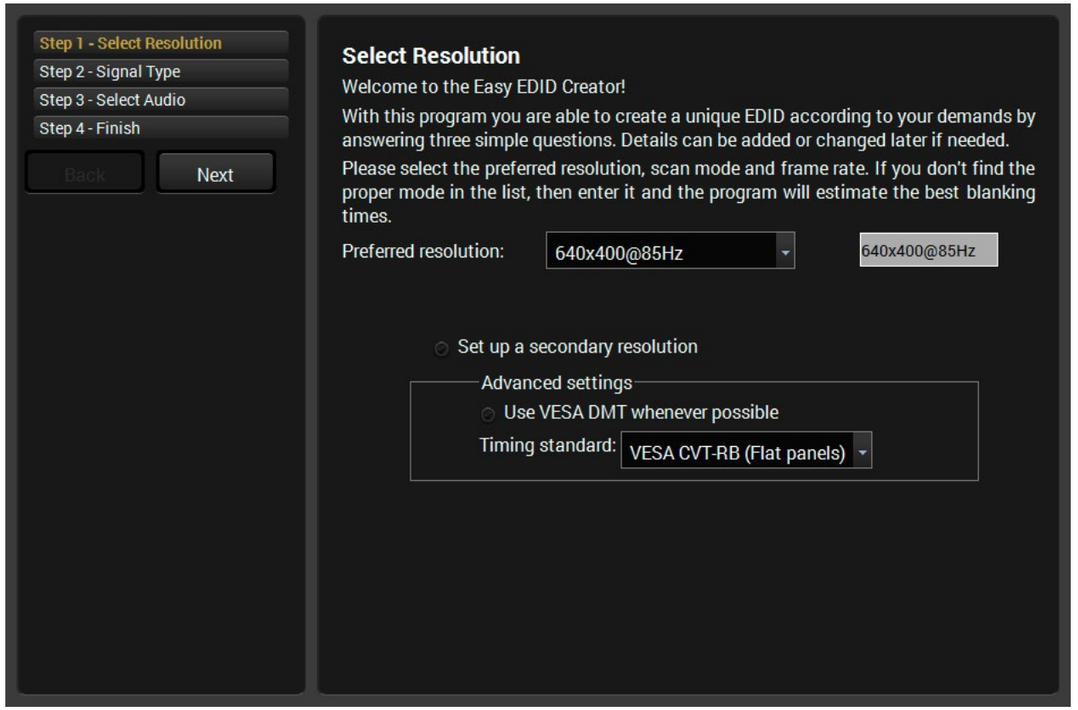
5.9.4. Editing an EDID

Select an EDID from the Source panel and press the **Edit** button to display the Advanced EDID Editor window. The editor can read and write all descriptors that 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, saved in an EDID file, or uploaded to the User memory. For more details about the EDID Editor, please visit our website and download the EDID Editor Application note.



5.9.5. Creating an EDID - Easy EDID Creator

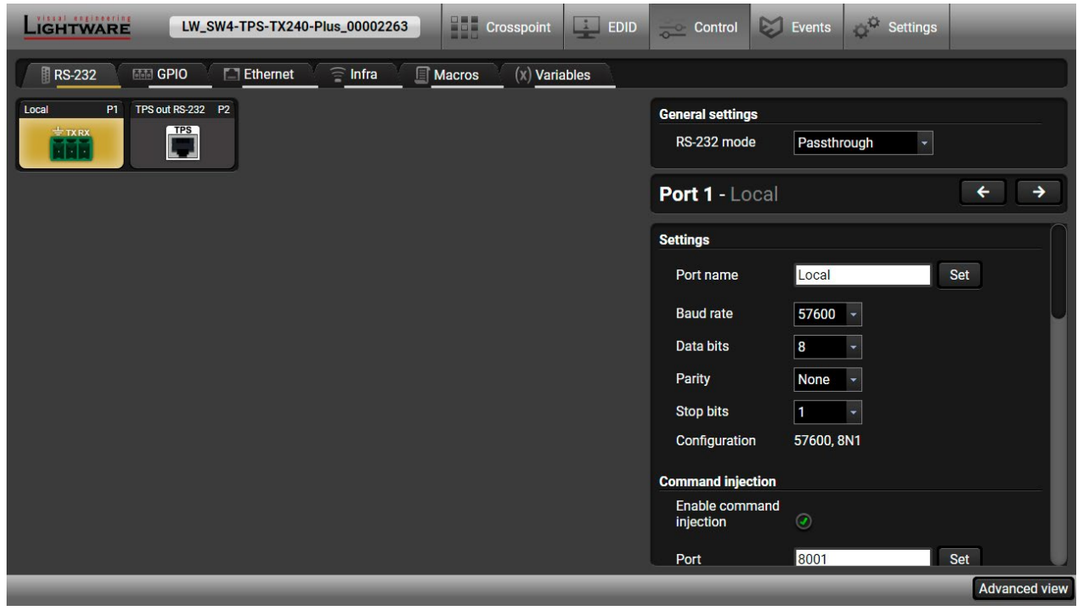
Since the Advanced EDID Editor mentioned above needs more complex knowledge about EDID, Lightware introduced a wizard-like interface for fast and easy EDID creation. With Easy EDID Creator it is possible to create custom EDIDs in four simple steps. By clicking on the **Create** button below the Source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



EDID Creator window

5.10. Control Menu

5.10.1. RS-232



RS-232 tab in Control menu

The following settings and functions are available (both on local and TPS serial ports):

- Operation mode: Control, Command Injection, or Disconnected (for more details about serial interface modes see the Serial Interface section);
- Baud rate: 4800, 7200, 9600, 14400, 19200, 38400, 57600, 115200;
- Data bits: 8 or 9;
- Parity: None, Odd, or Even;
- Stop bits: 1, 1.5, or 2;
- Command injection: enable or disable; port number; *#commandinjection*
- Control protocol: LW2 or LW3; *#protocol #rs232 #rs-232 #serial*
- Message sending via serial port; *#message*
- Reloading factory defaults (see factory default settings in the Factory Default Settings section).

ATTENTION! If the matrix is connected to a TPS2 output board of a matrix frame, the RS-232 configuration settings (baud rate, data bits, etc..) will not be changeable on the matrix side.

RS-232 Message Sending

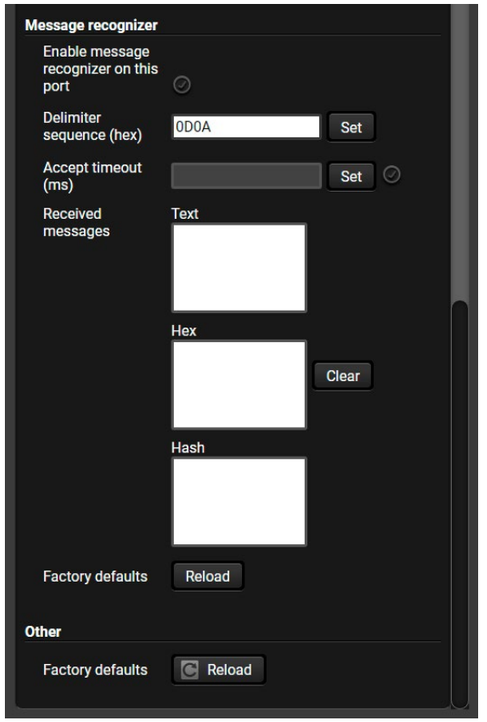
The message in the field can be sent out via the current RS-232 port. Response cannot be seen in the surface.

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

RS-232 Message Recognizer

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.2.0b13.

This tool can be used to recognize messages coming from the RS-232 port. The message can be used as a Condition in Event manager and an Action can be defined for it.



Definitions

Delimiter sequence (hex): Each message is closed by this separator (if defined).

Accept timeout (ms): When the set time has passed after the last received message and delimiter was not detected, the device saves the data into the Text, Hex, and Hash properties. The timeout setting is useful if there is no special or easily defined delimiter in the incoming data, but there is a time gap between the messages.

Text: The recognized message in ASCII-format.

Hex: The recognized message in hex format.

Hash: Binary data that is mapped from the original message. The length of the hash is shorter, and the same message results the same hash.

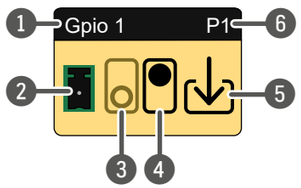
Working Method

A message got recognized from the incoming data if one of the following occurs:

- The set DelimiterHex is detected in the message, or
- The set TimeOut has passed since receiving the last data bit.

5.10.2. GPIO

The GPIO port has 7 pins that operate at TTL digital signal levels and can be controlled by LDC or protocol commands. Select a GPIO pin 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 the GPIO interface, see the GPIO Interface section.

5.10.3. Ethernet

Ethernet Ports

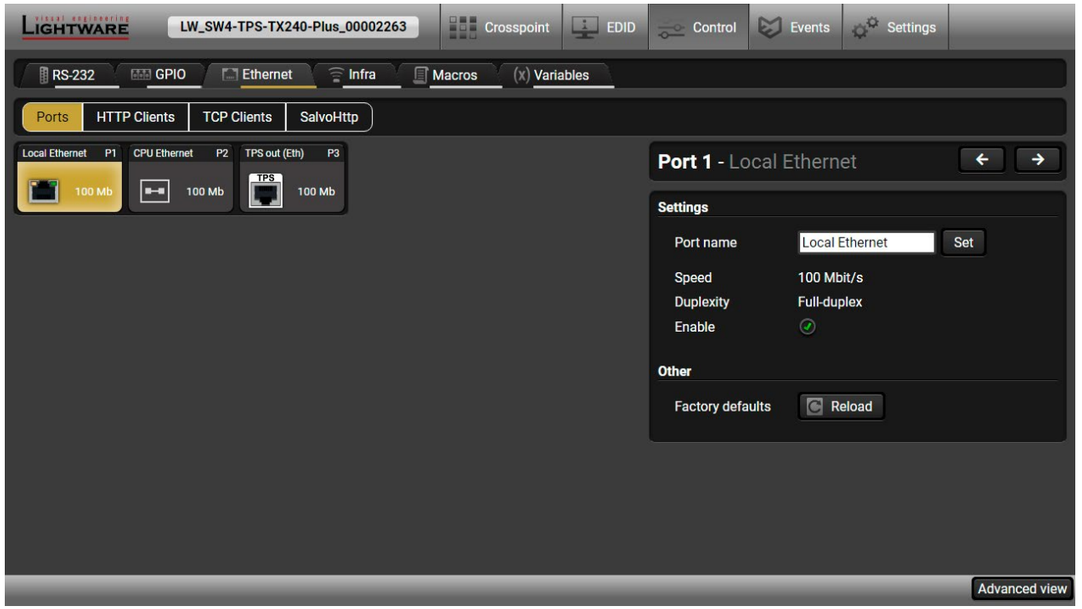
Three ports are displayed in the Ethernet settings: Local, CPU, and TPS*. You can check the status of the Ethernet line by each port: the speed and the duplexity of the connection.

The following settings are available for each port:

- Enable / disable the port; *
- Reload factory defaults.

* CPU Ethernet port cannot be disabled.

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



Ports tab in the Control/Ethernet menu

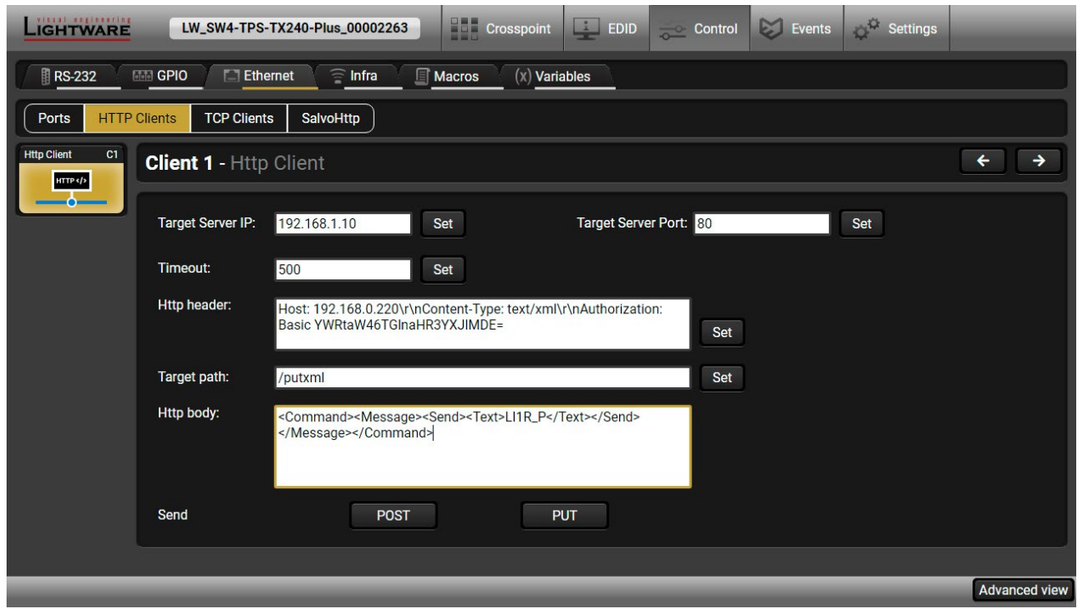
HTTP Clients (HTTP Post and Put Message Sending)

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

ATTENTION! This feature means posting or putting **HTTP** messages from the Lightware device to another device. Encrypted transmission (**HTTPS**) is not supported.

The HTTP Clients tab allows sending HTTP post and put messages to the desired server IP:port no. Control commands can be set to the target device, but it is not suitable for processing the response (e.g. querying a parameter/status), since the response is just an acknowledge (ACK). *#http*

The feature is also available by LW3 commands, see the HTTP Messaging section.



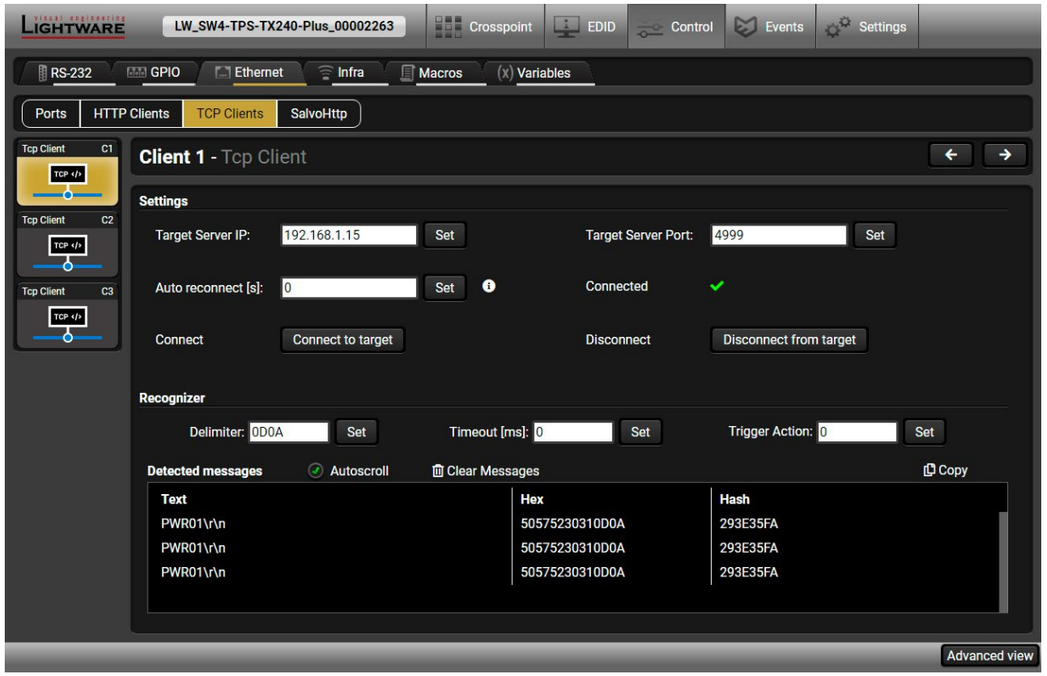
HTTP Clients tab in the Control/Ethernet men

When you press the enter in the **Http header** or **Http body** text box, the \r\n is added automatically.

TCP Clients (TCP Message Recognizer)

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

This tab is for the preparation and monitoring interface for the TCP recognizer, which may trigger Event Manager Actions. A simple example can be seen in the TCP Recognizer section.*#tcprecognizer #message*



TCP Clients tab in the Control/Ethernet menu

The target device has to be set as a TCP client (three clients can be set):

Step 1. Type and set the **Target IP address**.

Step 2. Type and set the **TCP port number**.

Step 3. Make sure the same **TCP port is opened** and Enabled in the target device.

Step 4. Press the **Connect to target** button.

Step 5. Make the target device send a message and check it in the Detected messages list.

- **Auto reconnect:** Numeric value; sets the time (seconds) between the automatic reconnections.
- **Delimiter:** When the delimiter hex string is detected in the incoming data, the message is saved from the first bit until the delimiter (or the data between the two delimiters).
- **Timeout:** If there is no response within the set time interval (milliseconds), the data that is received from the last delimiter will be accepted.
- **Trigger Action:** If data is received that is closed with the recognized delimiter, an Action can be run. Type the number of the Event (without letter 'E').

SalvoHttp Status Page (Receiving HTTP Message)

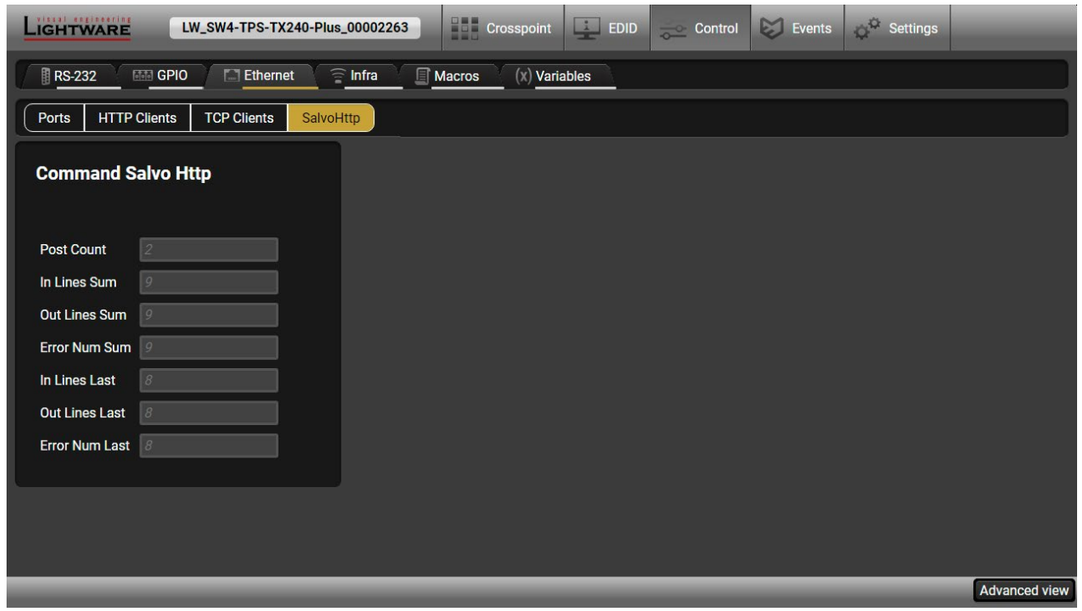
DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

ATTENTION! This feature means sending **HTTP** messages from an external device to the Lightware device. Encrypted transmission (**HTTPS**) is not supported.

In this case, a batch of commands can be sent over HTTP to the Lightware device for processing. Post the commands to the <IP_address>/protocol.lw3 address and the commands are processed immediately and sequentially. *#http*

Control commands can be sent to the Lightware device, but it is not suitable for querying a parameter/ status, since the LW3 responses are not sent back to the sender.

ATTENTION! If the Cleartext Login (Login Settings) is enabled in the device, the login has to be the first command. No commands will be processed without a successful login. See the syntax in the Logging into the Device section.



SalvoHttp tab in the Control/Ethernet menu

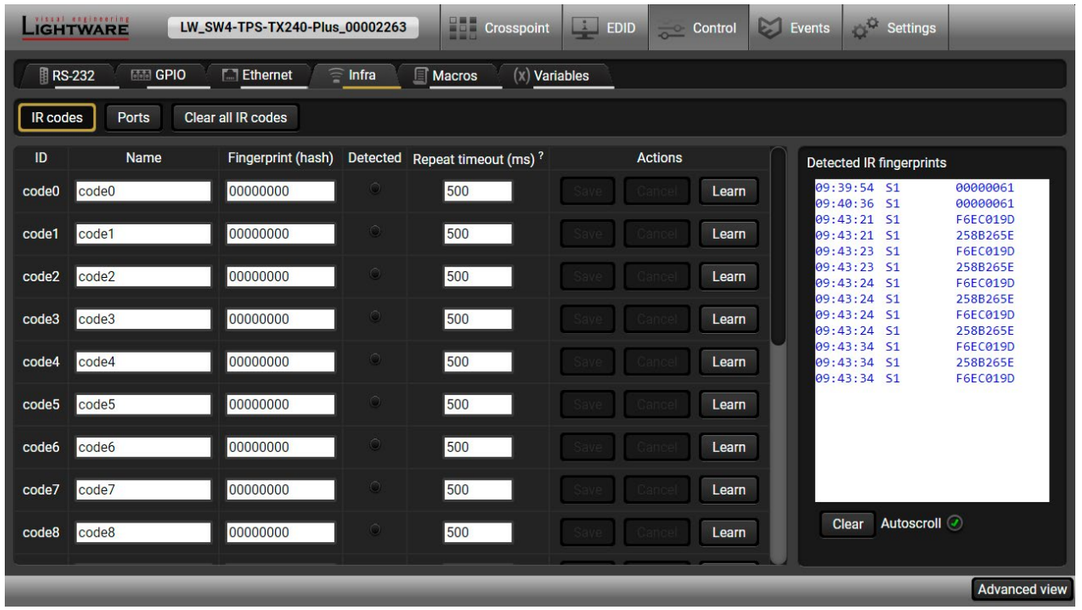
5.10.4. Infra

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.

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

IR Codes *#infra #infrared*

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.



IR codes window in Control menu

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.

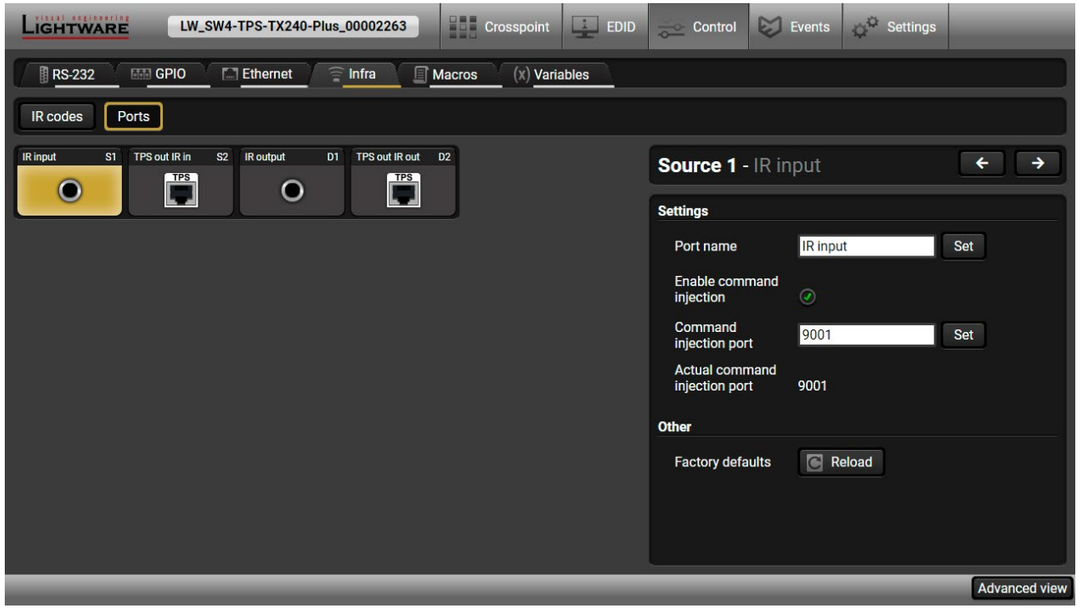
Step 3. Turn the remote controller to the IR detector. A pop-up window appears in LDC - press your remote button to learn.

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

The user can set the name and command injection port to each source and destination. For more details about the IR interface, see the Infrared Interface section.



Infra tab – Ports window

Clear all IR codes

Clicking on the button deletes all stored IR fingerprints.

5.10.5. Macros

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

DEFINITION: Macro is a batch of pre-defined commands stored in the device. *#macro*

You can create your custom macros in a file, upload it to the device and run at any time. The number of the macros depends on the device type, SW4-TPS-TX240-Plus transmitters can handle up to 50 macros.

Important Notes about Macros

- The macros are stored in device presets.
- The commands of a macro are executed sequentially (even if error happens at a command).
- Macros allow long commands that is suitable for e.g. infra code sending.
- Macros cannot be edited in the device.
- Macros are not saved when backup is created. See the Saving the Macros section.

Macro File Structure

Format:

```
;<preset_name>
;Begin <macro1_name>
<LW3_commands>
;End <macro1_name>
;Begin <macro2_name>
<LW3_commands>
;End <macro2_name>
```

Example:

```
;myDeviceMacros
;Begin myMacro1
CALL /MEDIA/VIDEO/XP:unmuteSource(I3)
CALL /MEDIA/VIDEO/XP:switch(I3:O1;I3:O2)
;End myMacro1
;Begin myMacro2
CALL /MEDIA/VIDEO/XP:unmuteSource(I4)
CALL /MEDIA/VIDEO/XP:switch(I4:O1;I4:O2)
;End myMacro2
```

`<preset_name>`: it will be displayed in the Settings/Backup submenu (device configurations list).

`<macro_name>`: each Macro must have a unique name.

`<LW3_commands>`: LW3 SET and CALL commands. Syntax is not checked, error is not reported.

ATTENTION! If you use the same name for a new macro, the existing one will be deleted.

Open a simple text editor and save the file with 'LW3' extension.

Uploading New Macros into a New Preset

The recommended way for macros is to use a Device configuration preset for this purpose exclusively. When you have to add new macros or change any of them, use the preset. The uploading steps are the following:

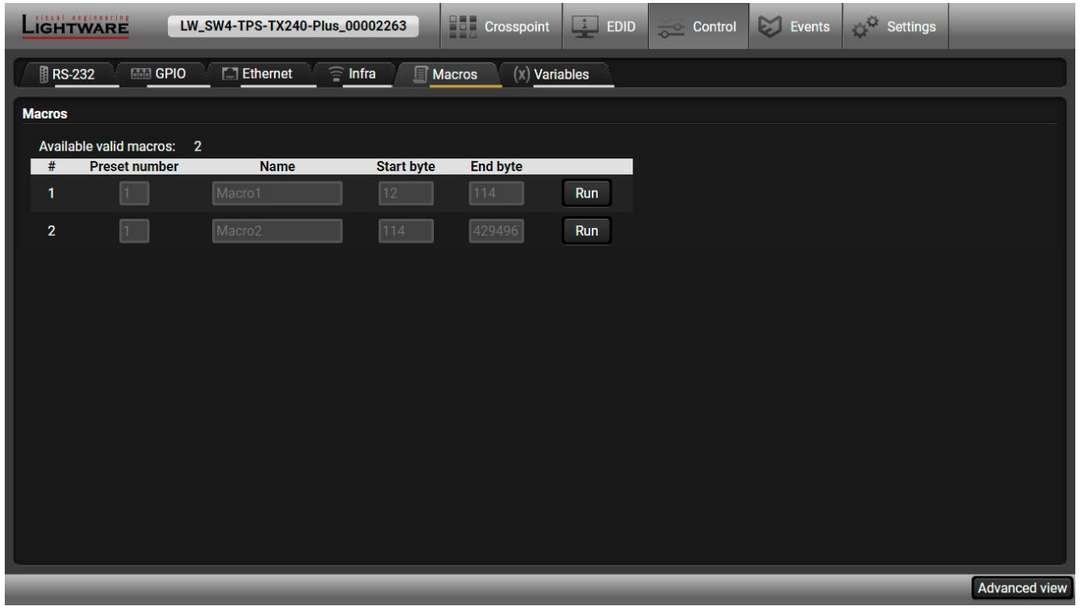
Step 1. Create the **file** with macros according to the macro file structure and save it.

Step 2. Navigate to the **Settings/Backup** submenu.

Step 3. Select a device configuration **preset** at the bottom of the page.

Step 4. Press the **Upload** button, browse the LW3 file and press **Open**.

ATTENTION! The preset and the macros of the selected slot will be erased. If there is a macro with the same name already in the device, it will be removed and the new one will be available.



Discovered Macros in the device shown under Control/Macros submenu

Adding Macros to an Existing Preset

Step 1. Navigate to the **Settings/Backup** submenu.

Step 2. Select a device configuration **preset** at the bottom of the page.

Step 3. Press the **Download** button and click on **Save** in the pop-up window.

Step 4. Open the **file** with a simple text editor and add the desired macros to the bottom of the commands between the `;Begin <macro_name>` and `;End <macro_name>` labels.

Step 5. Save the file and navigate to the **Settings/Backup** submenu.

Step 6. Select the same device configuration **preset** as selected in **Step 2**.

Step 7. Press the **Upload** button, browse the LW3 file and press **Open**.

If you follow the steps above, the existing macros of the selected preset will be preserved. But if there is a macro with the same name already in the device, it will be removed and the new one will be available.

Saving the Macros

When you make a backup of the device, the macros are not saved in that file. Sometimes, it is necessary to save the macros into a file and for example apply them in another (same type of) device. Follow these steps:

Step 1. Navigate to the **Settings/Backup** submenu.

Step 2. Select the device configuration **preset** that is used for the macros at the bottom of the page.

Step 3. Press the **Download** button and click on **Save** in the pop-up window.

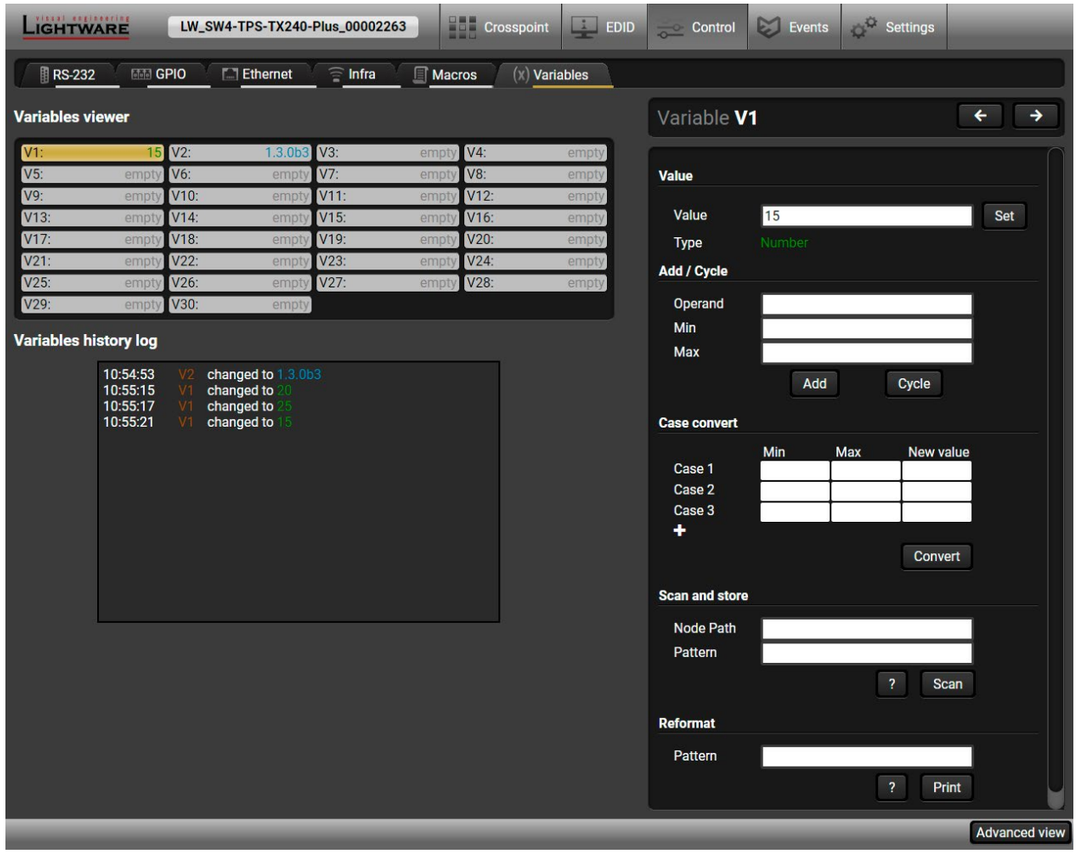
5.10.6. Variables

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

You can create custom variables in number or text format, which can be used in the Event Manager. The variables can have the following properties/methods: *#variables*

- Numeric (integer) type with min/max value setting, or string-type (determined automatically)
- Increment/step the numeric value,
- Value-dependent case operations,
- Reading and storing the values of LW3 properties into string or numeric variables.
- The max length of a string variable can be 15 characters. Numeric variable is defined between -2147483648 and 2147483647.

The defined variables are stored in a non-volatile memory and the value is kept in case of a reboot.



Variables tab in the Control menu

Value Section

You can set the value of the variable by the field. The type of the variable is determined automatically based on its value (numeric/string).

Add / Cycle Section

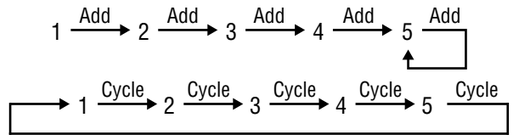
This section can be used for numeric types.

- **Operand**: the increment, the number that will be added to the current value (negative value is accepted).
- **Min (optional)**: the lowest allowed value
- **Max (optional)**: the highest allowed value
- **Add** button: the operand will be added to the current value. If the result would be higher than the max setting, the max will be valid; if the result would be lower than the min setting, the min will be valid
- **Cycle** button: the operand will be added to the current value. If the result would be beyond the limit (min/max), the value will be stepped to the other end of the interval.

Examples

The following shows the difference between the **Add** and the **Cycle** options. The input values are the same in both cases:

- **Min**: 1
- **Max**: 5
- **Operand**: 1



In **Add** case: when the value hits the limit (max), the operand will not increase the value any more.

In **Cycle** case: when the value hits the limit (max), the value will be stepped to the other end of the interval.

Similar case happens vice versa: when the operand is a negative number and the value hits the min value.

TIPS AND TRICKS: Set min=1, max=2, operand=1 and use the **cycle** method. Thus, the value of the variable can be toggled, which can be linked to a property with two states (e.g. low/high level) in Event manager.

Case Convert

This tool can be used to change the value of a variable if it fits in any of the defined intervals. The check and the change will be performed only if you press the **Convert** button. A typical example is when two different ranges of values have to meet:

Incoming values: between 0 and 255 (e.g. the slider of a controller can have these values).

Outgoing values: between 0 and 100 (e.g. the controlled device accepts these values).

Defined cases:

	Min	Max	New value
Case 1	1	25	10
Case 2	26	50	20
Case 3	51	75	30
Case 4	76	100	40
Case 5	101	125	50
Case 6	126	150	60
Case 7	151	175	70
Case 8	176	200	80
Case 9	201	225	90
Case 10	226	255	100

Scan and Store

This tool can be used to get the value (or a part) of an LW3 property. The defined path will be checked according to the pattern and the result will be saved into the variable (number or string type). Press the **?** button to open the pattern options:

Pattern	Pattern description
%s	String of characters stopping at the first whitespace character
%<number>s	The next <number> of characters (string) stopping at the first whitespace
%c	One character
%<number>c	The next <number> of characters
%[<characters>]	Defined character set, specified between brackets
%[^<characters>]	Negated character set, specified between brackets which will be skipped
%*	Ignored part
<custom_text>	User-defined text

Examples

Node Path [1]	Property Value	Pattern [1]	Scanned result
/MANAGEMENT/STATUS.CpuTemperature	42 C; 0;75; 0;7	%s	42
/MANAGEMENT/STATUS.CpuFirmware	1.3.0b3 r32	%12s	1.3.0b3
/MEDIA/VIDEO/XP.DestinationPortStatus	T00AA;T00AF	%6c	T00AA
/MEDIA/UART/P1.Rs232Configuration	57600, 8N1	%*[^,], %s	8N1
/MEDIA/AUDIO/XP.SourcePortStatus	T000A;T000B;T000F	%*6c%5c	T000B
/MANAGEMENT/UID.PackageVersion	1.3.0b6 r37	%[^b]%*	1.3.0
/MANAGEMENT/NETWORK.HostName	lightware-00005031	lightware-	00005031

[1] defined by the user

Reformat

The value of the variable can be changed by adding text as prefix and/or postfix. Type **%s** to indicate where to insert the original value.

Example

- **Original value**: 3
- **Pattern**: input%s
- **Modified value**: input3

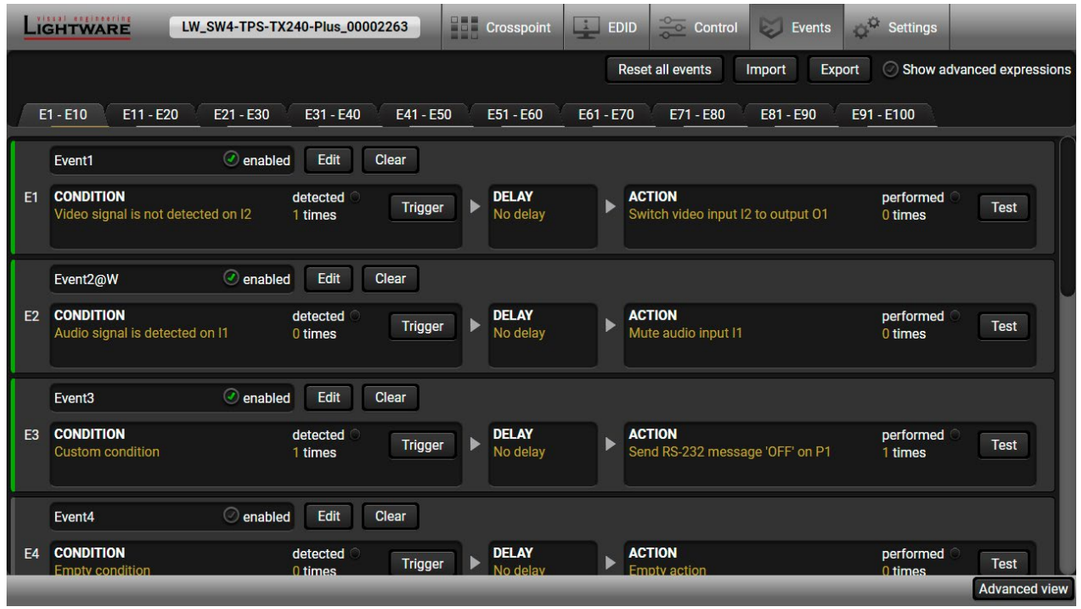
5.11. Event Manager

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 for displaying, 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 Events menu, or by LW3 protocol commands. The number of configurable events depends on the device that you are using currently.

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**.

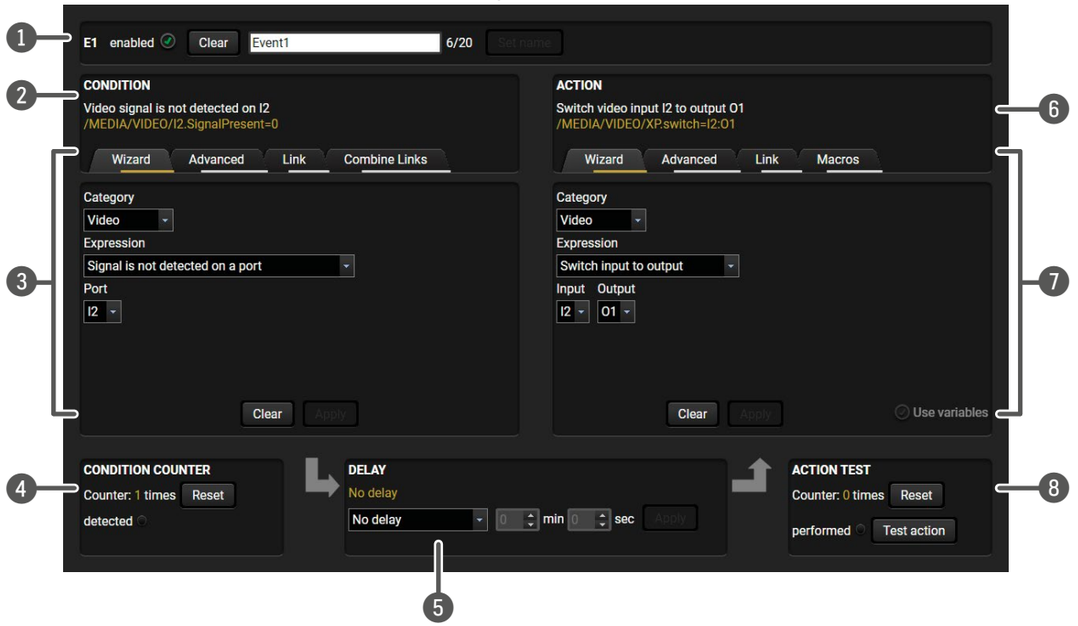


Control menu, Event Manager tab

#eventmanager

5.11.1. 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**	Different tools are 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**	Different tools are 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.

5.11.2. 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 by 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 be set, it is going to be displayed.

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

INFO: This mode is also available for setting the **Action**.

Advanced Mode

The goal of this mode is the same as that 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.

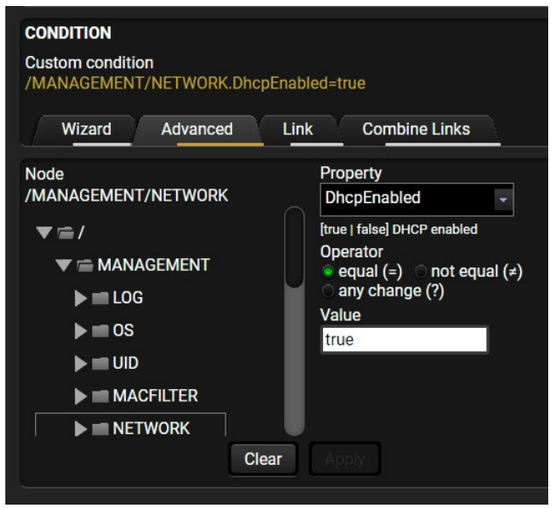
Step 1. Click on the **Edit** button of the desired Event; the **Event editor** is displayed.

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 select the necessary property and set the value.

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

INFO: This mode is also available for setting the **Action**.



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.

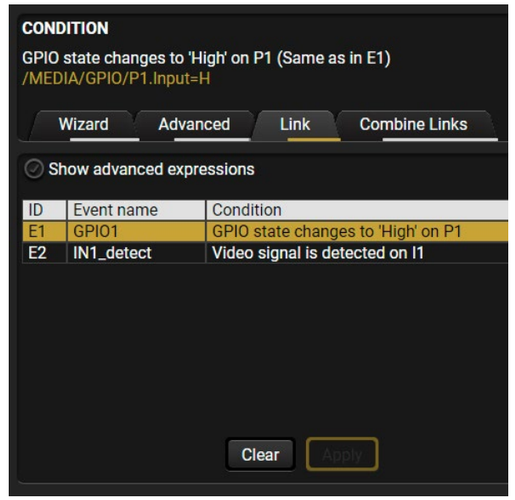
Step 1. Click on the **Edit** button of the desired Event; the **Event editor** is displayed.

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

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

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

INFO: This mode is also available for setting the **Action**.



Combine Links

DIFFERENCE: This feature is available from FW package v1.3.0b6.

The first generation of the Event Manager is able to sense a change (one condition) but in some cases that is not enough. The practical experience has shown there is a need to examine more conditions as follows: if one of the set conditions becomes true (while the other conditions are fulfilled), then the set Action is launched. The **Combine Links** tool allows setting these Conditions. Follow the steps below:

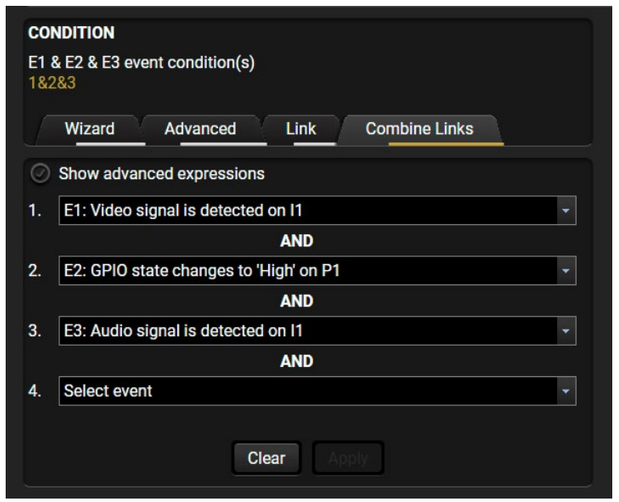
Step 1. Create individual **Conditions** in separate Events.

Step 2. Create a new Event and navigate to the **Combine Links** tab in the Editor.

Step 3. Select up to four **Conditions** in the **left** panel.

Step 4. Set the desired **Action** (and do not forget to **enable** the Events).

INFO: This mode is available for setting the **Condition only**.

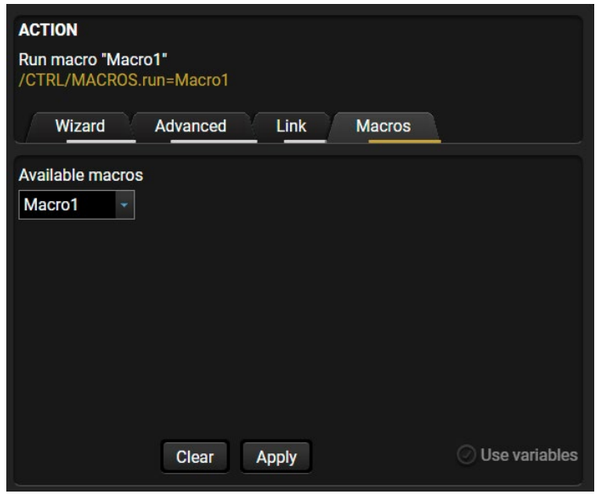


Linking a Macro (Action)

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

Macros stored in the device can be run as Actions. Thus, a lot of commands can be run by using only one Event. The commands will be processed one-by-one after each other.

#macro



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 **Macros** button in the **Action** panel.

Step 3. Select the desired **Macro** from the list, then press the **Apply** button to store settings.

If the **Use variables** option is enabled, you can link a variable by the **$** character. If you do so (e.g. $1), the device will handle it as the V1 variable. You can send the value of the variable e.g. as a TCP message.

See more information about the Macro settings in the Macros section.

5.11.3. Special Tools and Accessories

The Name of the Event

The name of a port can be changed by typing the new name and clicking on 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.

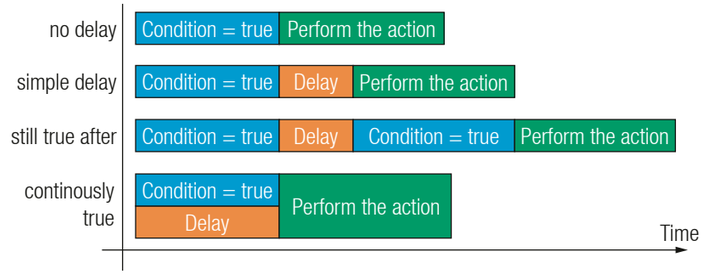
Testing the Action

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 the settings below:



- **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**: 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: The **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 the Link tool is used.

Variables

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

The variables and the tools (shown in the Control/Variables tab) can be used in the Event Manager.

Condition Wizard *#variables*

The desired variable can be checked if its value is changed to a specific value.

Action Wizard

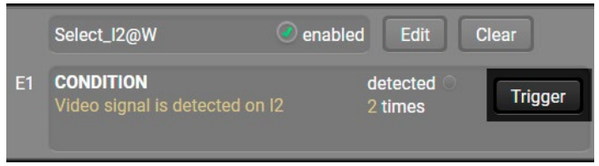
The value of a variable can be set/changed by the same methods as in the Control/Variables tab:

- Setting the exact value
- Increasing the value with/without limits
- Converting the value (e.g. interval change)
- Scanning and storing, or reformatting a property/parameter

If the **Use variables** option is enabled, you can link a variable by the **$** character. If you do so (e.g. $1), the device will handle it as the V1 variable. You can send the value of the variable e.g. as a TCP message.

Condition Triggering

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.



This improvement works as if a condition is detected. When a complex control system is built, a Condition may trigger numerous Actions. A typical example is when a system is powered on and the 'ready-to-use' state has to be loaded. In this case, there could be many actions that are based on the same condition. In order to reduce the number of the commands, you can trigger one 'key' condition, which could start the whole process.

5.11.4. 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.

5.11.5. 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.

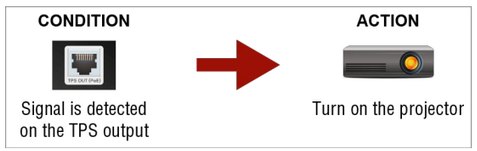
Import all the Events

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.

5.11.6. Event Creating - Example

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



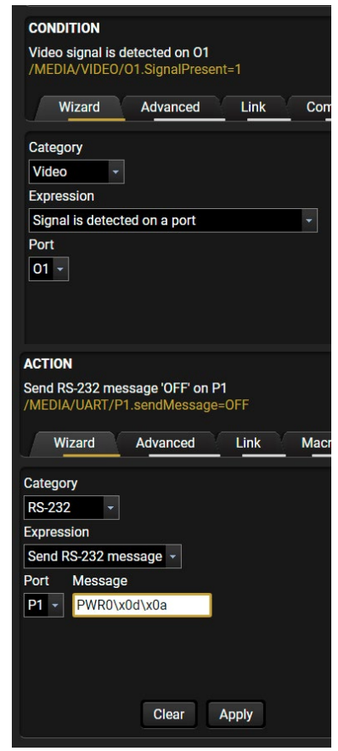
The Concept

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 are set exactly the same as 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



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, then 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>

E.g. 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:

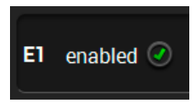
$$<command_1><\x0d\x0a><command_2><\x0d\x0a>...$$
$$...<command_n><\x0d\x0a>$$

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.

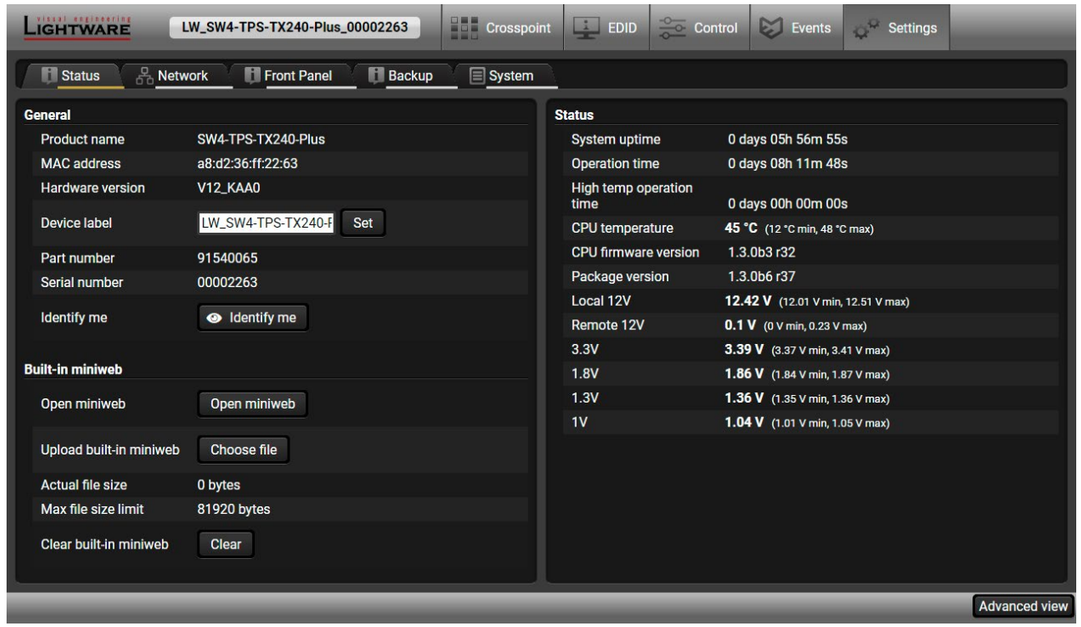


Select the **E1 enabled** pipe in the upper left corner to set the Event as launched.

INFO: If you do not find the required category/expression/etc that 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 too as a condition.

5.12. Settings Menu

5.12.1. 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. The device label can be changed to a unique description by the **Set** button.

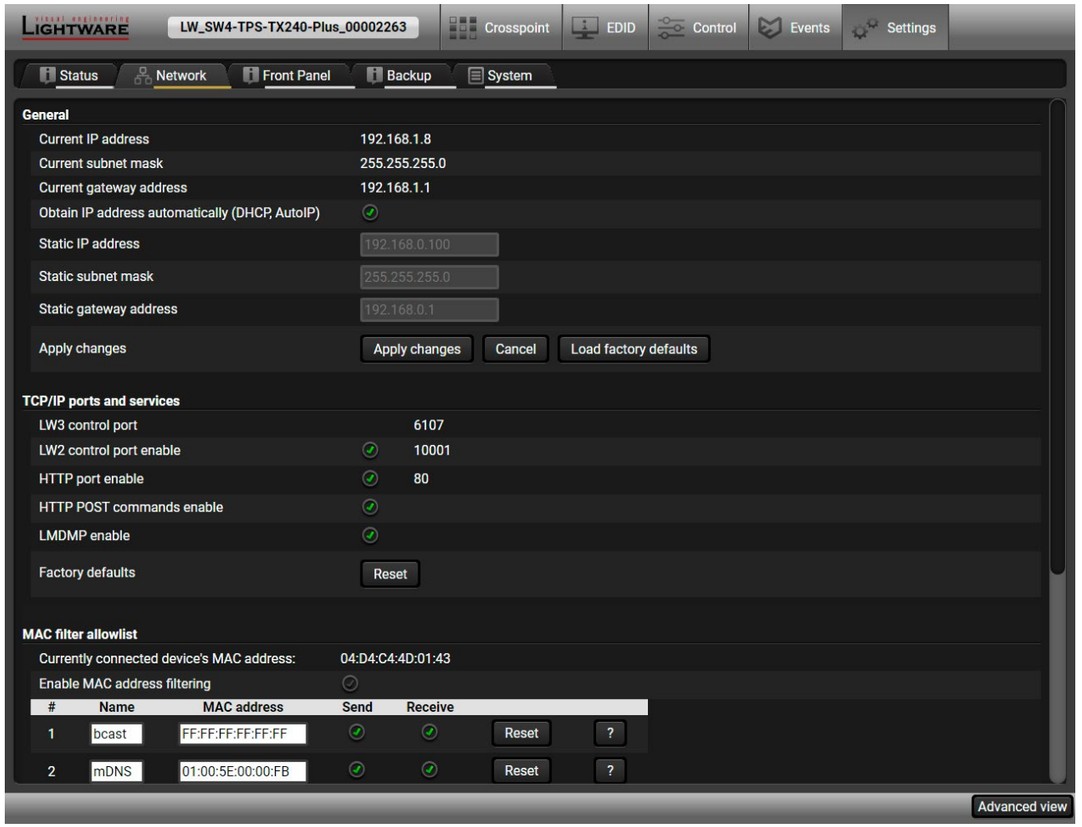
INFO: The **Device label** is a user-editable name displayed next to the main menu. The **Product name** is a read-only property.

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

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

#firmwareversion #label #devicelabel

5.12.2. Network



Network tab in Settings menu

General

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

TCP/IP Ports and Services

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

The IP Port Block feature is an additional protection for the Cleartext login, see the Cleartext Login (Login Settings) section. There are TCP/IP ports in Lightware devices that are not protected by the login, so you can disable them if necessary. For example, due to the working method of the LW2 communication, the Cleartext login does not provide protection when an LW2 command is sent to the device, that is why the TCP port no.10001 shall be blocked manually. *#dhcp #ipaddress #network #portblock*

MAC Filter Allowlist

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

Another level of the security is the MAC Filtering tool. You can create a list of network devices based on the MAC address that are allowed: *#macfilter*

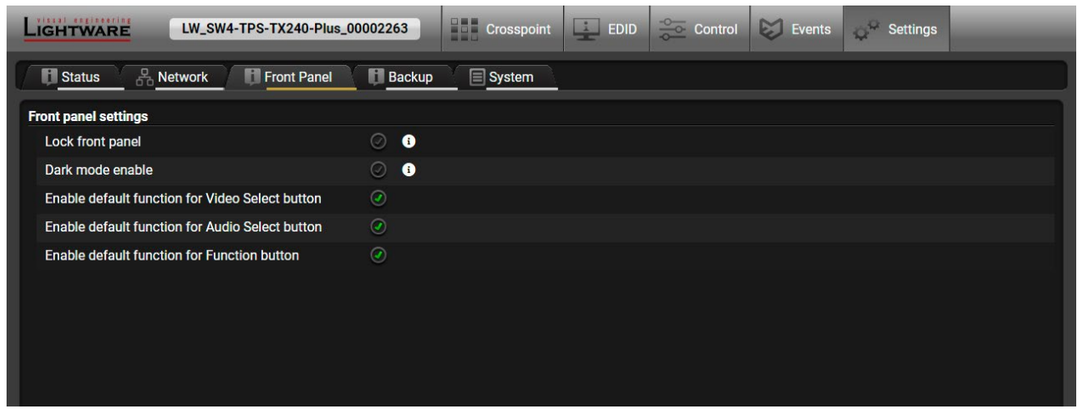
- Controlling the device (Send option), or
- Querying parameters (Receive option) to/from the Lightware device.

Do not forget to press the **Apply changes** button to store the new settings.

ATTENTION! The first three lines are factory default values and they are necessary for the proper working.

ATTENTION! If the device is installed in a network where it gets IP address from a DHCP server and you plan to use the MAC filtering, make sure the MAC address of the DHCP server is added to the whitelist. Otherwise, the device will not get an IP address and will be unreachable.

5.12.3. Front Panel



Front panel tab in the Settings menu

Front Panel Settings

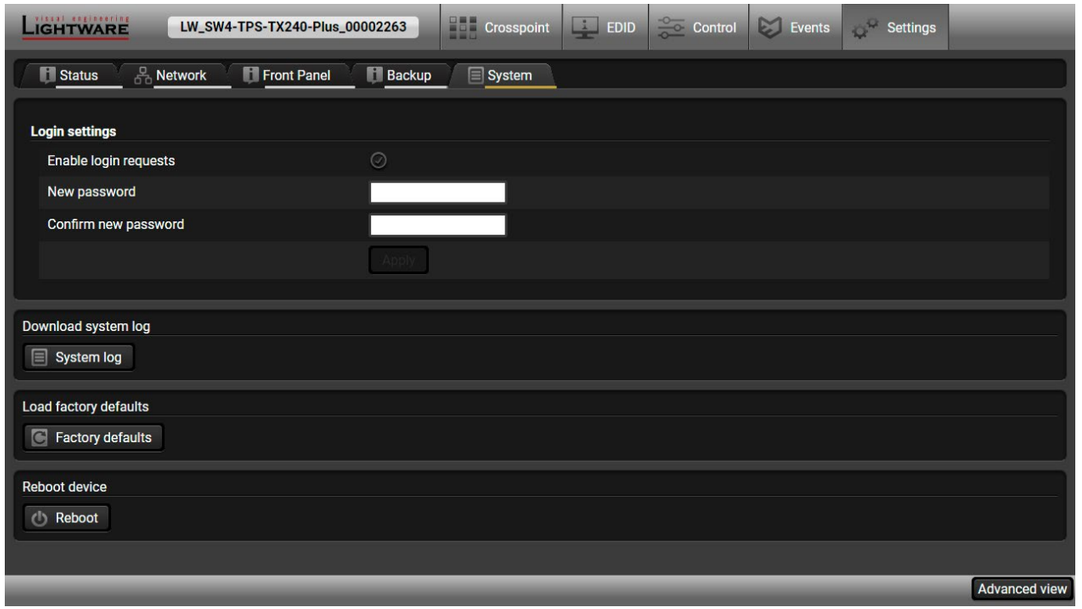
- **Lock front panel:** When this option is enabled, the front panel buttons are locked and they can be unlocked by disabling this option, or pressing the **OUT2 Video select** and **Set audio config** buttons together or with an LW3 protocol command.
- **Dark mode enable:** When Dark mode is enabled, all LEDs on the unit are switched off after 1 minute (by default) if no buttons are pressed. Pressing any button brings back the status info on the LEDs without performing the function of the button itself. *#darkmode*

The further options can be used to set the default function for the buttons or disable and use them for another function by the Event manager.

5.12.4. Backup

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

5.12.5. System



System tab in Settings menu

Cleartext Login (Login Settings)

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

This cleartext login tool allows setting a password for login, thus the device will not accept any command coming from a control interface (RS-232, Ethernet, etc...) without login. The device will be visible in the Device Discovery window (as the device type and the serial number can be queried without login) but connection can be established only after successful login. The login is valid until a TCP socket break in case of Ethernet connection. *#login*

ATTENTION! If the login is enabled, the The Miniweb Room Control will not be available.

INFO: The login password is erased and the login is disabled when restoring the factory default values.

Further functions

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

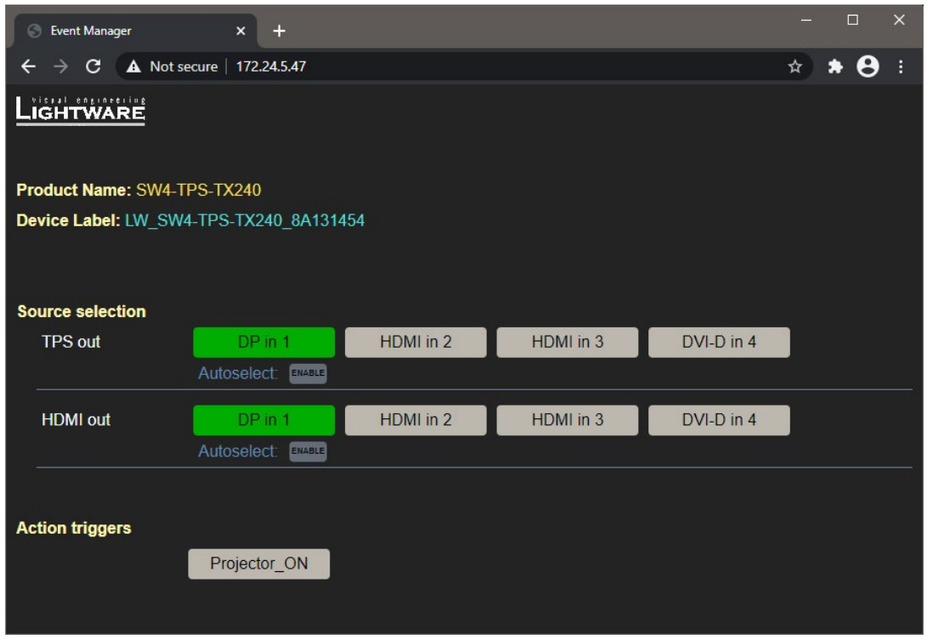
5.13. The Miniweb Room Control

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

ATTENTION! The Miniweb is available from firmware package v1.2.0b13. The default control page can installed in the device during the first firmware update process by the user if the necessary parameter is enabled. See the Step 3. Check the update parameters. section.

The default control page allows the following: *#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.

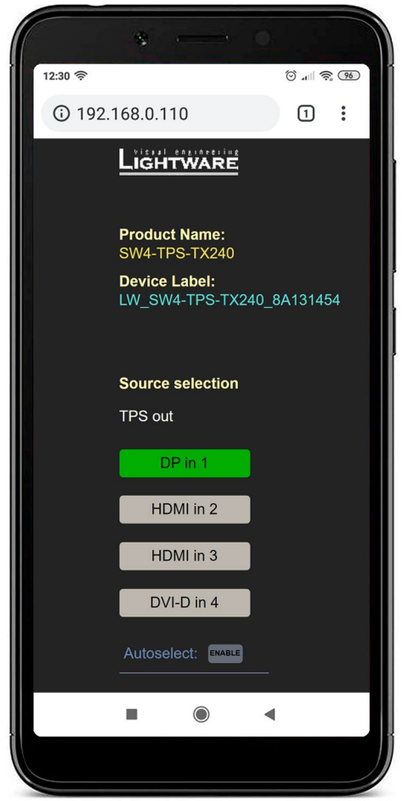


The Control Page Displayed in a Desktop Browser (with Action Trigger Buttons)

5.13.1. Opening the Miniweb

The Miniweb is available by:

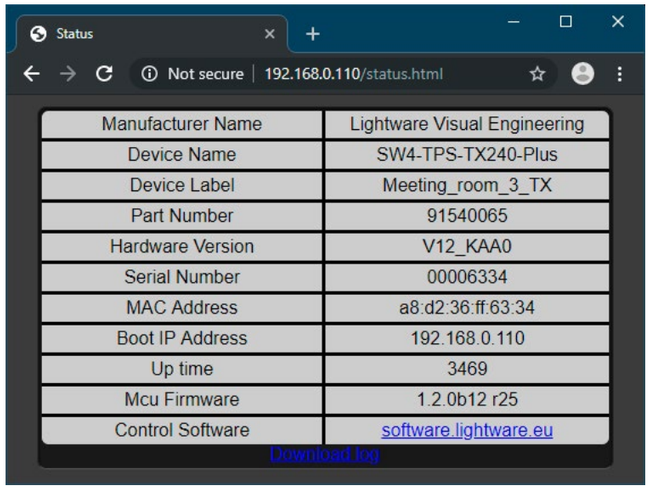
- Opening a **web browser** and typing the **http://<IP_address>.index.html** or the **http://<IP_address>** in the address line, or
- Launching the **LDC**, connecting to the device, navigating to **Settings/Status** and pressing the **Open miniweb** button.
- The host name can be used instead of the IP address; see the Setting the Host Name section.



The Control Page Displayed in a Smartphone Browser

5.13.2. 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)

5.13.3. Miniweb Customization

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

- Any Event that 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.

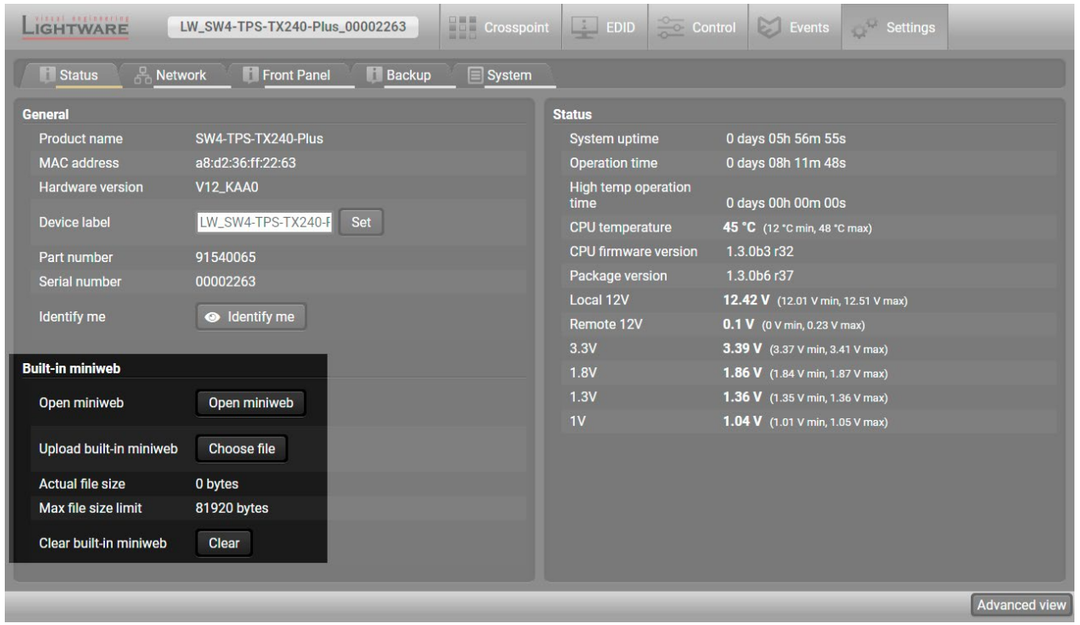
To add the desired Action as a button, **append the name** of the desired Event with the **@W** characters - see below:

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. A 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 update process, see the Step 3. Check the update parameters. section.

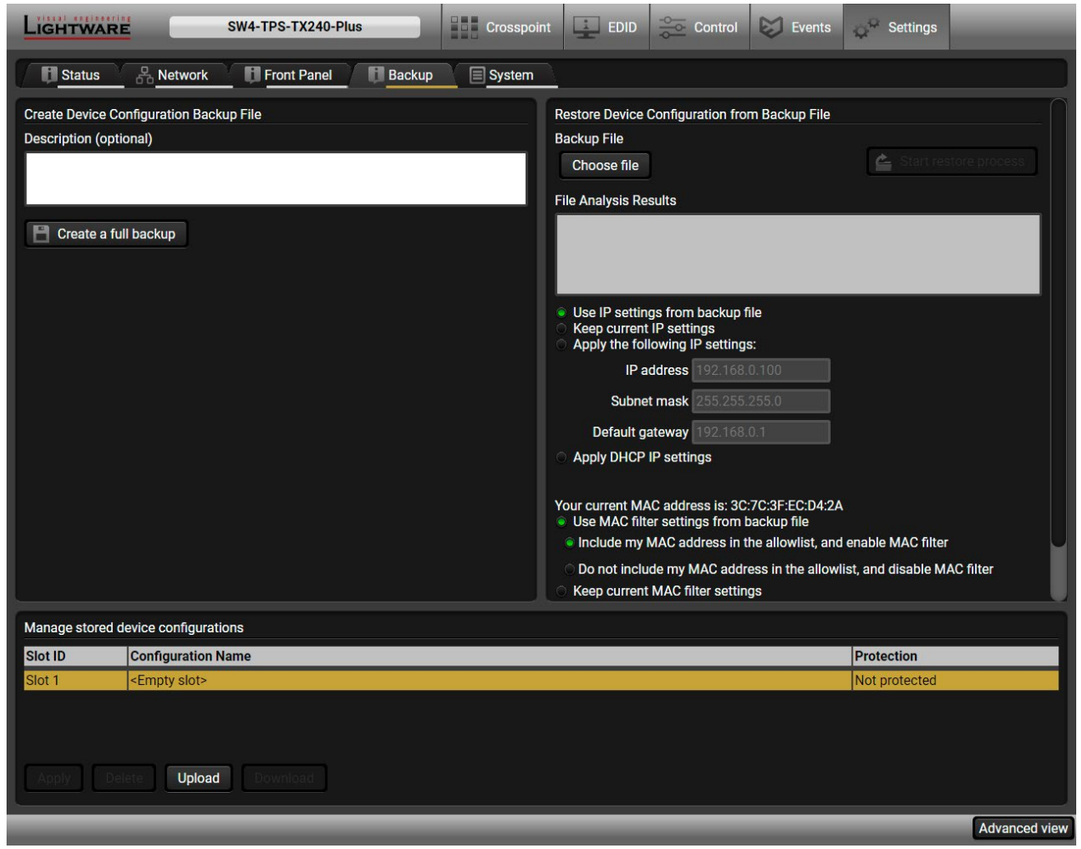


The Miniweb Room Control Section in LDC

5.14. Configuration Cloning (Backup Tab)

The 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

ATTENTION! Macros cannot be saved into the backup file. If you have macros stored in a Configuration slot, download it separately and upload it in the target device.



Backup tab

5.14.1. Cloning 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 with 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 needed when DHCP is not used.

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

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

ATTENTION! Macros cannot be saved into the backup file. If you have macros stored in a Configuration slot, download it separately and upload it in the target device.

5.14.2. Save the Settings of the 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 TYPE>_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 that will be executed during the restore process. The file can be viewed (and/or edited) by a simple text editor, e.g. Notepad.

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

See the entire list of saved data in the Content of the Backup File section

5.14.3. Upload the Settings to a Device (Restore)

WARNING! Please note that the settings will be permanently overwritten with the restored parameters in the device. Withdrawal is not possible.

ATTENTION! The cloning can be successful if 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** the desired file.

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

Step 4. Choose the **IP settings** that 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.

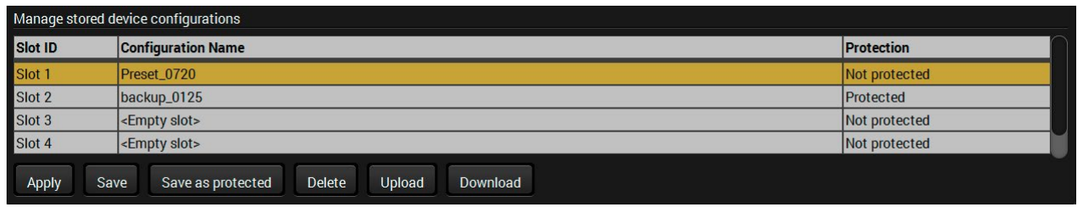
Step 5. Select the desired **MAC filter settings** to be applied in the device. See more information about this feature in the MAC Filter Allowlist section.

Step 6. Press the **Start restore process** button and click on the **Yes** button when asked.

Step 7. Reboot the device to apply the network settings after finishing.

5.14.4. Create and Restore Backups from the Device Memory

The device can store configurations in its own memory, four slots are available for this purpose.



You can save the configuration to the desired slot:

- **without protection:** it can be easily applied/deleted, or
- **with protection:** applying or deleting the configuration can be protected with a password.

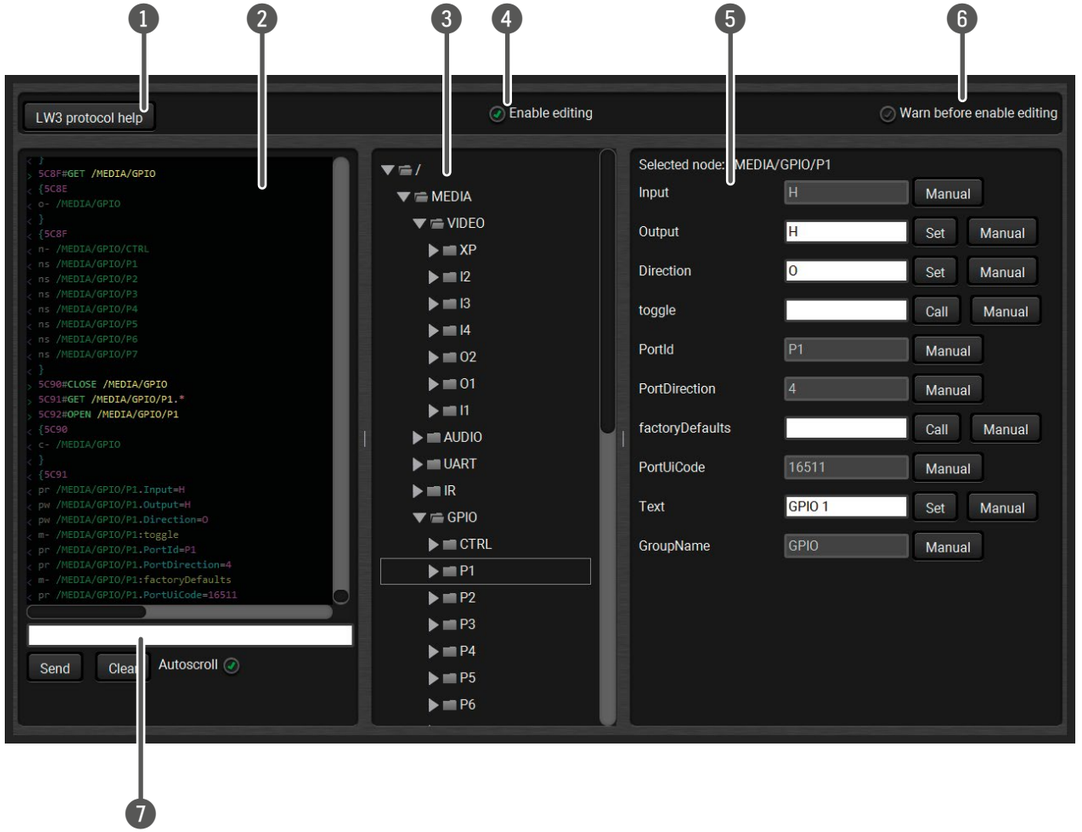
Apply	Loading the selected configuration	Delete	Deleting the selected configuration
Save	Saving the current configuration to the selected slot without protection	Upload	Loading a configuration from a file to the selected slot
Save as protected	Saving the current configuration to the selected slot with a password	Download	Saving the selected configuration as a file

The presets can be used for the macros as well, please see the Macros section.

WARNING! Loading factory default settings will erase all presets in the device memory!

5.15. Advanced View Window

This window is the surface of the Lightware Protocol 3 (LW3) tree with a terminal window. Commands and specific parameters (that 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 opens a help window, which describes the most important information about LW3 protocol commands in HTML format.

2 **Terminal window** — Commands and responses with time and date are listed in this window. Sent commands start with '>' character, received responses start 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.

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

4 **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.

5 **Node list** — Correspondent parameters and nodes are shown that are connected to the selected item in the protocol tree. The commands typed in these fields are escaped automatically

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

7 **Command line** — The commands typed in this line are not escaped automatically. See more information in the Escaping section. 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

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 response commands can contain upper and lower case letters as well.

Legend for Control Commands

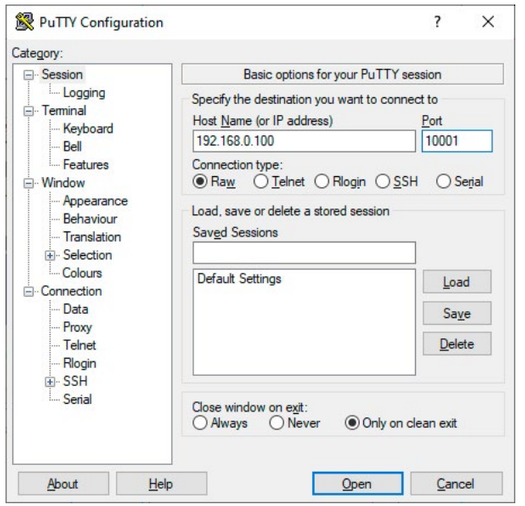
Format	Explanation
<in>	Input number in 1- or 2-digit ASCII format (01, 5, 07, 16, etc.)
<out>	Output number in 1- or 2-digit ASCII format
<in/out>	Input or output port number in 1- or 2-digit ASCII format *
<in2>	Input number in 2-digit ASCII format (01, 02, 10, 12 etc.)
<out2>	Output number in 2-digit 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 on your control device, for example **Putty** or **CLI**. *#terminal*



Establishing Connection

Follow the steps to establish connection to the receiver:

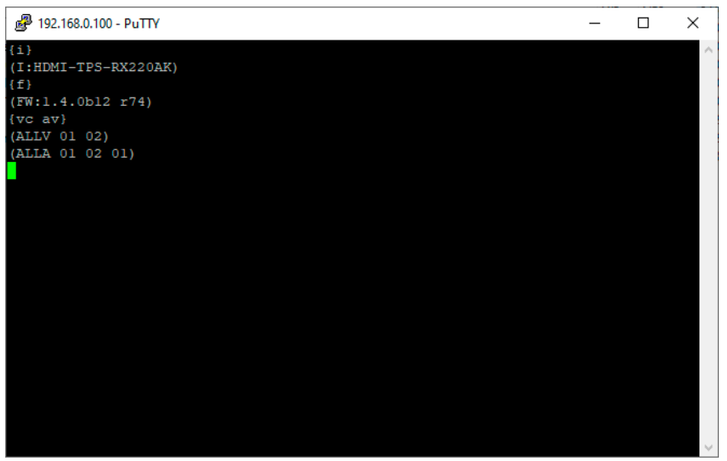
Step 1. Connect the receiver to a LAN over Ethernet.

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. Querying the Supported Commands

The LW2 commands supported by the device can be queried by this command.

Command and Response *#producttype*

→ {LCMD}
← (LCMD# <command>: <description>)CrLf
← ...
← (LCMD END)CrLf

Example

→ {lcmd}
← (LCMD# LCMD: List all commands)
← (LCMD# PING: Always response PONG)
← (LCMD# CT: Compile time)
← ...
← (LCMD END)

INFO: The response is longer, not all the lines can be seen in the example.

6.3.2. Viewing the Product Type

The device responds its name.

Command and Response

→ {i}
← (I:<PRODUCT_TYPE>)CrLf

Example

→ {i}
← (I:SW4-TPS-TX240)

6.3.3. Viewing the Device Label

The device responds its label - not the same as product type. The device label can be changed in LDC Status or by LW3 command, see the Setting the Device Label section.

Command and Response

→ {LABEL}
← (LABEL=<DEVICE_LABEL>)CrLf

Example

→ {label}
← (LABEL=TX_OFFICE)

6.3.4. Querying the 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.

6.3.5. Viewing the CPU Firmware Version

Command and Response *#firmwareversion*

→ {f}
← (FW:<FW_VER>•<s>)CrLf

Parameters

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

Example

→ {f}
← (FW:1.2.0b12 r25)

6.3.6. Connection Test

Simple test to see if the connection is established successfully.

Command and Response

→ {PING}
← (PONG!)CrLf

Example

→ {ping}
← (PONG!)

6.3.7. Viewing the Serial Number

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

Command and Response

→ {S}
← (SN:<SERIAL_N>)CrLf

Example

→ {s}
← (SN:5A003192)

6.3.8. 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)

6.3.9. Viewing the 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).

6.3.10. Viewing the Firmware for All Controllers

Shows the firmware version of the installed controller.

Command and Response

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

Parameters

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

Example

→ {fc}
← (CF SW4-TPS-TX240-Plus 1.3.0b3 r32)
← (CF END)

The device has one control panel. *#firmwareversion*

6.3.11. Restarting 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.

6.3.12. Querying 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)

6.3.13. Restoring 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. AV Port Settings

6.4.1. Switching 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 the AV option, when available.

Example 1

→ {2@1 AV}

← (O01 I02 AV)

I2 audio and I2 video input ports are switched to the 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 do not contain embedded audio. If you use the AV option in case of a 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. Muting an 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. Unmuting an 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. Locking an 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. Unlocking an 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 (whether it was locked or unlocked).

6.4.6. Viewing the 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 be two lines, one for the Video and one for the Audio port states.

6.4.7. Viewing 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. Changing 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 output O1 and O2 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. Changing 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 output O1 and O2 is enabled and set to Priority mode.

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

6.4.10. Changing 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 the priority of all 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. Changing the 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 the priority of all 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. Setting the Level and Direction for Each Pin

GPIO pins can be configured as follows. See more details about the 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. Querying 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. Setting 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. Setting 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 Querying 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. Setting 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 Querying 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. Applying Network Settings

Apply the network settings and restart the network interface.

Command and Response

→ {ip_apply}
← (IP_APPLY)CrLf

Example

→ {ip_apply}
← (IP_APPLY)

6.6.6. Enabling/Disabling the Ethernet Port

Command and Response

→ {ETH_ENABLE=<switch>}
← (ETH_ENABLE=<switch>)CrLf

Parameters

If the <switch> parameter is **0**, the port is **disabled**. If its value is **1**, the port is **enabled**.

Example

→ {ETH_ENABLE=1}
← (ETH_ENABLE=1)

6.7. Serial Port Configuration

6.7.1. Setting the Control Protocol

See more information about the RS-232 modes in the Serial Interface section.

Command and Response

→ {RS232=<mode>}

← (RS232=<mode>)CrLf

Parameters

Parameter	Parameter description	Value	Value description
<mode>	The serial port working mode	**PASS**	Pass-through mode
		CONTROL	Control mode
		CI	Command Injection mode

The current setting can be queried by the **{RS232=?}** command.

Example

→ {RS232=CONTROL}

← (RS232=CONTROL)

6.7.2. Serial Port Format Setting (Local port)

This command sets the format of the local RS-232 port (Phoenix).

Command and Response

→ {RS232_LOCAL_FORMAT=<baud_rate>;<data_bit>;<parity>;<stop_bit>}

← (RS232_LOCAL_FORMAT=<baud_rate>;<data_bit>;<parity>;<stop_bit>)CrLf

Parameters

Parameter	Parameter description	Value	Value description
<baud_rate>	Baud rate setting (optional)	**4800; 7200; 9600; 14400; 19200; 38400; 57600; 115200**	
<data_bit>	Databit setting (optional)	**8; 9**	
<parity>	Parity setting (optional)	**N; E; O**	
<stop_bit>	Stop bit setting (optional)	**1; 1.5; 2**	

The current setting can be queried by the **{RS232_LOCAL_FORMAT=?}** command. Any parameter can be skipped by using '**X**' as a value, see the example.

Example

→ {RS232_LOCAL_FORMAT=57600;X;X;1}

← (RS232_LOCAL_FORMAT=57600;8;N;1)

The databit and parity settings have not been changed.

6.7.3. Serial Port Format Setting (Link port)

This command sets the format of the link RS-232 port (TPS port).

Command and Response

→ {RS232_LINK_FORMAT=<baud_rate>;<data_bit>;<parity>;<stop_bit>}

← (RS232_LINK_FORMAT=<baud_rate>;<data_bit>;<parity>;<stop_bit>)CrLf

Parameters

See the previous section.

Example

→ {RS232_LINK_FORMAT=38400;X;X;1}

← (RS232_LINK_FORMAT=38400;8;N;1)

The databit and parity settings have not been changed.

6.7.4. Serial Port Protocol Setting (Local port)

Command and Response

→ {RS232_LOCAL_PROT=<protocol>}

← (RS232_LOCAL_PROT=<protocol>)CrLf

Parameters

Parameter	Parameter description	Value	Value description
<protocol>	The applied protocol in the communication	**LW2**	Lightware 2 Protocol is active
		LW3	Lightware 3 Protocol is active

The current setting can be queried by the **{RS232_LOCAL_PROT=?}** command.

Example

→ {RS232_LOCAL_PROT=LW2}

← (RS232_LOCAL_PROT=LW2)

6.7.5. Serial Port Protocol Setting (Link port)

This command sets the communication protocol of the link RS-232 port (TPS port).

Command and Response

→ {RS232_LINK_PROT=<protocol>}

← (RS232_LINK_PROT=<protocol>)CrLf

Parameters

See the previous section.

Example

→ {RS232_LINK_PROT=LW2}

← (RS232_LINK_PROT=LW2)

6.8. LW2 Commands – Quick Summary

General LW2 Commands

Querying the Supported Commands
→ {LCMD}

Viewing the Product Type
→ {i}

Viewing the Device Label
→ {LABEL}

Querying the Control Protocol
→ {P_?}

Viewing the CPU Firmware Version
→ {f}

Connection Test
→ {PING}

Viewing the Serial Number
→ {S}

Compile Time
→ {CT}

Viewing the Installed Board
→ {IS}

Viewing the Firmware for All Controllers
→ {FC}

Restarting the Device
→ {RST}

Querying Health Status
→ {ST}

Restoring Factory Default Settings
→ {FACTORY=ALL}

AV Port Settings

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

Muting an Output
→ {#<out>•<layer>}

Unmuting an Output
→ {+<out>•<layer>}

Locking an Output
→ {#><out>•<layer>}

Unlocking an Output
→ {+<<out>•<layer>}

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

Viewing Crosspoint Size
→ {getsize•<layer>}

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

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

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

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

GPIO Configuration

Setting the Level and Direction for Each Pin
→ {GPIO<pin_nr>=<dir>;<level>}

Network Configuration

Querying the Current IP Status
→ {IP_STAT=?}

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

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

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

Applying Network Settings
→ {ip_apply}

Enabling/Disabling the Ethernet Port

→ {ETH_ENABLE=<switch>}

Serial Port Configuration

Setting the Control Protocol

→ {RS232=<mode>}

Serial Port Format Setting (Local port)

→ {RS232_LOCAL_FORMAT=<baud_rate>;<data_bit>;<parity>;<stop_bit>}

Serial Port Format Setting (Link port)

→ {RS232_LINK_FORMAT=<baud_rate>;<data_bit>;<parity>;<stop_bit>}

Serial Port Protocol Setting (Local port)

→ {RS232_LOCAL_PROT=<protocol>}

Serial Port Protocol Setting (Link port)

→ {RS232_LINK_PROT=<protocol>}

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.

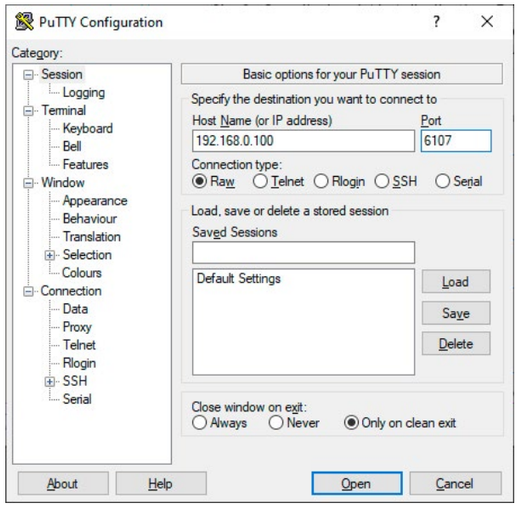
7.1. Overview

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 LW3 protocol commands can be applied to the receiver using a terminal application. You need to install one of them on your control device, for example **Putty** or **CLI**. *#terminal*



Establishing Connection

Follow the steps to establish connection to the receiver:

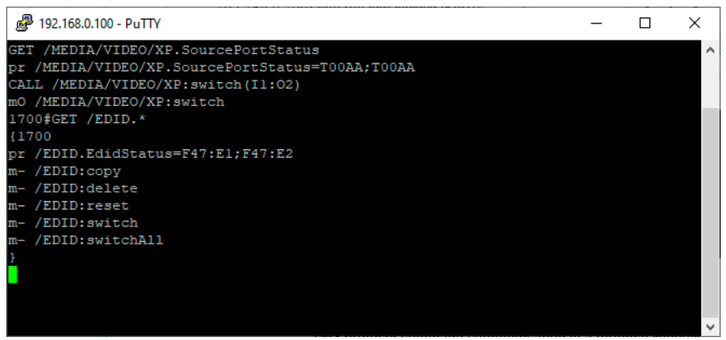
Step 1. Connect the receiver to a LAN over Ethernet.

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.

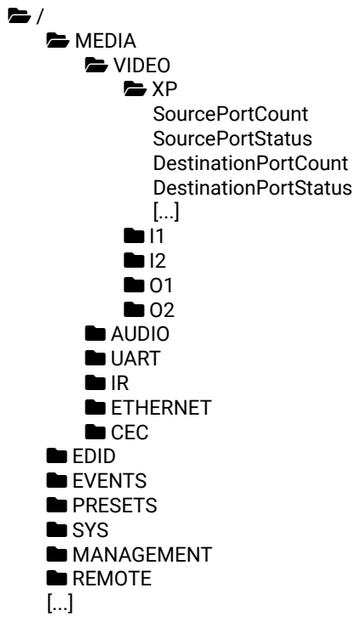
Once the terminal window is opened, you can enter the LW3 protocol commands, which are listed in the following sections.

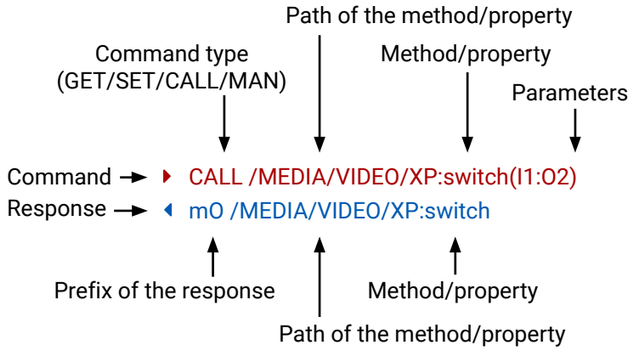


LW3 protocol command communication in a terminal window

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.
- The length of a line (command/response, command type / prefix, path, method/property and parameters together) can be **max. 800 bytes**.
- The command lines have to be closed by Carriage return and Line Feed (**CrLf**)
- 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>	Specific property 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 command.

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 on 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 that 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 following: \ { } # % ( ) \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 that the property belongs to, an asynchronous notification is generated. This notification is called 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 to the subscription, the first user got a notification about the change.

7.3.9. Subscription

DEFINITION: Subscribing 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

Unsubscribe from a Node

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

Subscribe to Multiple Nodes

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

Unsubscribe from Multiple Nodes

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

Get the Active Subscriptions

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

7.3.10. Signature

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

Each line is terminated with 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 intends to receive 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*

The default format of the device label is: LW_<product_name>_<serial_no>

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 CPU Firmware Version

Command and Response *#firmwareversion*

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

Parameters

The <FW_version> 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. Querying the Package Version

DIFFERENCE: This command is available from FW package v1.2.0b14.

This command shows the installed **firmware package** version.

Command and Response

- GET·/MANAGEMENT/UID.PackageVersion
- pr·/MANAGEMENT/UID.PackageVersion=<package_version>

Example

- GET /MANAGEMENT/UID.PackageVersion
- pr /MANAGEMENT/UID.PackageVersion=1.2.0b14

7.4.6. 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)

7.4.7. 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*

7.4.8. Control Lock

Enable/disable the operation of the front panel buttons.

Command and Response *#lockbutton #buttonlock*

- SET·/MANAGEMENT/UI.ControlLock=<lock_status>
- pw·/MANAGEMENT/UI.ControlLock= <lock_status>

Parameters

Parameter	Parameter description	Values	Value description
<lock_status>	Front panel button locking status	**0**	**None:** all functions of the front panel button are enabled.
		1	The front panel buttons are locked but can be unlocked by button combination. See the details in the Forced Button Lock section
		2	The front panel buttons are locked and cannot be unlocked by button combination, only in LDC (on the Status tab) or using the LW3 command.

Example

- SET /MANAGEMENT/UI.ControlLock=1
- pw /MANAGEMENT/UI.ControlLock=1

7.4.9. Identifying the Device

Calling the method makes the status LEDs blink for 10 seconds. The feature helps to find the device physically.

Command and Response *#identifyme*

- CALL·/MANAGEMENT/UI:identifyMe()
- mO·/MANAGEMENT/UI:identifyMe

Example

- CALL /MANAGEMENT/UI:identifyMe()
- mO /MANAGEMENT/UI/identifyMe

7.4.10. Toggling the Dark Mode Setting

The LEDs of the device can be switched off, if their light could be annoying. In Dark mode, all the LEDs are switched off, except the LEDs of the RJ45 connectors (Ethernet and TPS in). *#darkmode*

Command and Response

- SET·/MANAGEMENT/UI/DARKMODE.DarkModeEnable=<mode_state>
- pw·/MANAGEMENT/UI/DARKMODE.DarkModeEnable=<mode_state>

Parameters

If the <mode_state> parameter is **true** (or **1**), the Dark mode function is **enabled**, if the parameter is **false** (or **0**), the function is **disabled**.

Example

- SET /MANAGEMENT/UI/DARKMODE.DarkModeEnable=true
- pw /MANAGEMENT/UI/DARKMODE.DarkModeEnable=true

7.4.11. Setting the Delay of the Dark Mode Setting

The Dark mode can be enabled rightaway, or after a certain time. Thus, the mode is enabled, if no buttons are pressed meanwhile. Pressing any button brings back the status info on the LEDs without performing the function of the button itself. The delay time can be set by this command.

Command and Response

- SET·/MANAGEMENT/UI/DARKMODE.DarkModeDelay=<delay_time>
- pw·/MANAGEMENT/UI/DARKMODE.DarkModeDelay=<delay_time>

Parameters

The <delay_time> parameter means seconds, and the default value is 60. If set to 0, no delay is applied, and the Dark mode can be enabled immediately by the **DarkModeEnable** property. This delay has an affect to the **wakeFromDarkMode** method as well.

Example

- SET /MANAGEMENT/UI/DARKMODE.DarkModeDelay=5
- pw /MANAGEMENT/UI/DARKMODE.DarkModeDelay=5

7.4.12. Running a Macro

DIFFERENCE: This command is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

DEFINITION: Macro is a batch of pre-defined commands stored in the device. *#macro*

You can create your custom macros in a file, upload it to the device and run at any time. The uploading can be done over LDC, see the Uploading New Macros into a New Preset section. The following LW3 command is suitable only for running a macro.

Command and Response

- CALL·/CTRL/MACROS:run(<macro_name>)
- mO·/CTRL/MACROS:run

Example

- CALL /CTRL/MACROS:run(Macro1)
- mO /CTRL/MACROS:run

7.5. Cleartext Login Protection

DIFFERENCE: This feature and the commands are available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

This cleartext login tool allows setting a password for login, thus any change in the device can be performed only after a successful login coming from any control interface (RS-232, Ethernet, etc...). The login is valid until a TCP socket break in case of Ethernet connection. *#login*

ATTENTION! If the login is enabled, the miniweb is not available.

INFO: The login password is erased and the login is disabled when restoring the factory default values.

The following can be queried without login:

- ProductName
- PartNumber
- SerialNumber
- FirmwareVersion
- PackageVersion
- MacAddress

7.5.1. Setting the Login Password

Command and Response

- CALL·/LOGIN:setPassword(<password>)
- mO·/LOGIN:setPassword

Example

- CALL /LOGIN:setPassword(pr0t3ctED)
- mO /LOGIN:setPassword

7.5.2. Logging into the Device

Command and Response

- CALL·/LOGIN:login(<password>)
- mO·/LOGIN:login

Example

- CALL /LOGIN:login(pr0t3ctED)
- mO /LOGIN:login

After a successful login, the **LoggedIn** property becomes **true** and the LW3 tree is available.

7.5.3. Logging out of the Device

Command and Response

- CALL·/LOGIN:logout(<password>)
- mO·/LOGIN:logout

Example

- CALL /LOGIN:logout(pr0t3ctED)
- mO /LOGIN:logout

After a successful logout, the **LoggedIn** property becomes **false** and the LW3 tree is protected.

7.5.4. Enabling/Disabling the Cleartext Login Function

ATTENTION! This property can be changed only if the **LoggedIn** property is **true**.

Command and Response

- SET·/LOGIN:LoginEnable=<login_state>
- pw·/LOGIN.LoginEnable=<login_state>

Parameters

If the <login_state> parameter is **true** (or **1**), the Cleartext login function is **enabled**, if the parameter is **false** (or **0**), the function is **disabled**. Please note that the function can be enabled without setting a password by the **setPassword** method.

Example

- SET /LOGIN.LoginEnable=true
- pw /LOGIN.LoginEnable=true

7.6. Video Port Settings

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

7.6.1. Querying the Status of the Input Ports

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

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

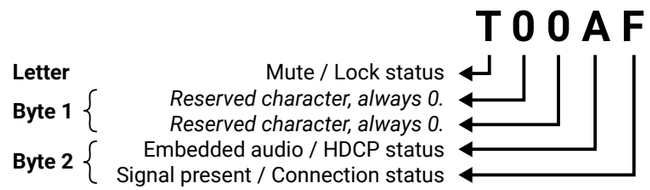
The response contains 5 ASCII characters for each port. The first character indicates the mute/lock state, the next four characters represent a 2-byte HEX code, showing the current state of the input ports.

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

7.6.2. Querying the Connected Input Port Number

DIFFERENCE: This command is available only for SW4-TPS-TX240-Plus from firmware v1.3.0b6.

The response of this command shows the input port that is connected to the queried output port.

Command and Response *#crosspoint*

- GET·/MEDIA/VIDEO/<out>.ConnectedSource
- pr·/MEDIA/VIDEO/<out>.ConnectedSource=<in>

Example

- GET /MEDIA/VIDEO/O1.ConnectedSource
- pr /MEDIA/VIDEO/O1.ConnectedSource=I1

7.6.3. Querying the Status of the Output Ports

Command and Response

- GET·/MEDIA/VIDEO/XP.DestinationPortStatus
- pr·/MEDIA/VIDEO/XP.DestinationPortStatus=<01_state>;<02_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 shows 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

7.6.4. 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.

7.6.5. Switching Video Input

Command and Response *#switch*

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

Example 1

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

Example 2

- CALL /MEDIA/VIDEO/XP:switch(0:O1)
- mO /MEDIA/VIDEO/XP:switch

When using 0 (zero) value as an input, the input will be disconnected and no signal will appear on the output.

7.6.6. 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 it 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: it is always the highest priority active video input that will be selected. **L: Last** detect mode: it is always the last attached input that 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.

7.6.7. 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.

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.

7.6.8. 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.

7.6.9. 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 (highest) to 30 (lowest). 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.

7.6.10. 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

7.6.11. 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

7.6.12. 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

7.6.13. 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

7.6.14. 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

7.6.15. Unmuting Output Port

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

7.6.16. 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

7.6.17. 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

7.6.18. 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

7.6.19. 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

7.6.20. 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

7.6.21. 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. The latter case occurs if the 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 always encrypted.

Example

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

7.6.22. 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

7.6.23. 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 parameters listed below.

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).

7.6.23.1. 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

7.6.23.2. 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

7.6.23.3. Test Pattern

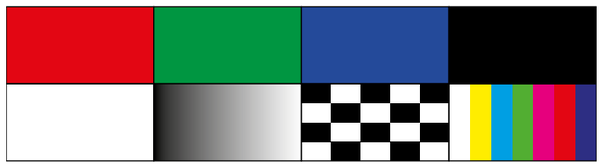
Command and Response

- 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

7.6.24. 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

7.6.25. 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

7.6.26. Querying the TPS Mode of the Transmitter

The final 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

7.6.27. 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

7.6.28. Querying the Established TPS Mode

The final 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. The command below is for querying the current 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

7.7. Audio Port Settings

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

7.7.1. 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

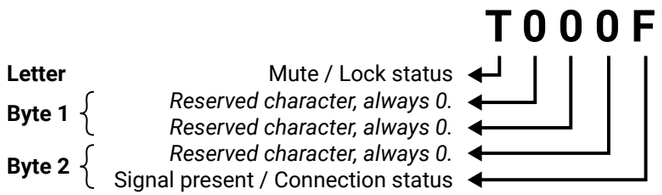
The response contains 5 ASCII characters for each input port. The first character indicates the mute/lock state, the next four characters represent a 2-byte HEX code, showing the current state of the input ports.

Example

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

Legend

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

7.7.2. 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 indicates the mute/lock state, the next 2-byte long HEX code shows 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

7.7.3. 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 the current device has a TPS and a local HDMI output port.

7.7.4. Switching Audio Input

Command and Response

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

Example 1

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

Example 2

- CALL /MEDIA/AUDIO/XP:switch(0:O1)
- mO /MEDIA/AUDIO/XP:switch

When using 0 (zero) value as an input, the input will be disconnected and no signal will appear on the output.

7.7.5. 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: it is always the highest priority active audio input that will be selected. **L: Last** detect mode: it is always the last attached input that 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.

7.7.6. 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.

7.7.7. 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.

7.7.8. 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.

7.7.9. 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

7.7.10. 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

7.7.11. 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

7.7.12. 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

7.7.13. 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

7.7.14. Unmuting an Output Port

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

7.7.15. 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

7.7.16. 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

7.7.17. Analog Audio Input Level Settings

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

7.7.17.1. 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

7.7.17.2. 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.

7.7.17.3. 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

7.7.17.4. 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.

7.7.17.5. 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=

7.7.17.6. 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

7.7.17.7. 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

7.7.17.8. 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

7.8. Event Manager Basics

The graphical interface of the Event Manager can be found in the LDC, which allows creating any kind of Events. In certain cases, the Events have to be arranged or modified by LW3 commands from another device. These commands are detailed in the coming sections.

7.8.1. How to arrange an Event?

The following are necessary to have a successful event:

- Defining the **Condition**
- Defining the **Action**
- Setting the **Delay** (optional)
- **Name** the Event and set to **Enabled.** (Setting the Event to **Enabled** as the last step is recommended.)

Command and Response

- SET·/EVENTS/E<loc>.Condition=<expression>
- pw·/EVENTS/E<loc>.Condition=<expression>

Parameters

The structure of the <expression> is: <node_path>.<property>=<value>.

Example 1 – property changes to a set value

- SET /EVENTS/E1.Condition=/MEDIA/VIDEO/I1.SignalPresent=1
- pw /EVENTS/E1.Condition=/MEDIA/VIDEO/I1.SignalPresent=1

The Condition is fulfilled if the **SignalPresent** property changes to '1'.

Example 2 – property changes anything but the set value

In some cases, the opposite is necessary: when the property does **not** equal with the value. If you need so, the **ConditionInverted** property must be set to **true**:

- SET /EVENTS/E2.Condition=/MEDIA/VIDEO/O1.ConnectedSource=I1
- pw /EVENTS/E2.Condition=/MEDIA/VIDEO/O1.ConnectedSource=I1
- SET /EVENTS/E2.ConditionInverted=true
- pw /EVENTS/E2.ConditionInverted=true

The Condition is fulfilled if the **ConnectedSource** property does not equal with 'I1' (in other words: if other input port is connected to O1 than I1).

Example 3 – property changes to anything

DIFFERENCE: This feature is available from firmware v1.3.0b6.

When it is not the property value that matters, but the change of the property value, the change can be set as a condition. In this case, put a **?** character to the end of the desired property:

- SET /EVENTS/E3.Condition=/MEDIA/VIDEO/O1.ConnectedSource?
- pw /EVENTS/E3.Condition=/MEDIA/VIDEO/O1.ConnectedSource?

If the **ConnectedSource** property changes (due to a crosspoint-switch), the set Condition is fulfilled.

7.8.2. Setting a Condition by Linking Another Condition

Command and Response

- SET·/EVENTS/E<loc>.Condition=<event_nr>
- pw·/EVENTS/E<loc>.Condition=<event_nr>

Parameters

The <event_nr> means the number (location) of the linked event without letter 'E'.

Example

- SET /EVENTS/E2.Condition=1
- pw /EVENTS/E2.Condition=1

The Condition of the E2 Event is set to be the same as set at E1 Event.

7.8.3. Setting a Condition by Linking More Conditions

DIFFERENCE: This command is available from firmware v1.3.0b3.

The first generation of the Event Manager is able to sense a change (one condition), but in some cases that is not enough. The practical experience has shown there is a need to examine more conditions (up to four) as follows: if one of the set conditions becomes true (while the other conditions are fulfilled), then the set Action is launched.

Command and Response

- SET·/EVENTS/E<loc>.Condition=<event_nr>&<event_nr>&<event_nr>&<event_nr>
- pw·/EVENTS/E<loc>.Condition=<event_nr>&<event_nr>&<event_nr>&<event_nr>

Parameters

The <event_nr> parameters mean the numbers (locations) of the linked Events without letter 'E'. Up to four events can be set.

Example

- SET /EVENTS/E4.Condition=1&2&3
- pw /EVENTS/E4.Condition=1&2&3

If two Conditions exist and the third is detected (changes to true), the Condition of E4 will be fulfilled and the Action of E4 will be launched.

TIPS AND TRICKS: You do not have to define Actions for E1, E2 and E3 Events and you can leave those **Disabled**.

7.8.4. Setting an Action by Specifying a Direct Path

Command and Response

- SET·/EVENTS/E<loc>.Action=<expression>
- pw·/EVENTS/E<loc>.Action=<expression>

Parameters

The structure of the <expression> is: <node_path>.<property_or_method>=<value>. Properties and methods are handled in the same way: dot (.) stands after the path in both cases, colon (:) is not used. Do not use brackets for methods. The <value> parameter is optional in case of certain methods.

Example

- SET /EVENTS/E1.Action=/MEDIA/VIDEO/XP.switch=I4:O1
- pw /EVENTS/E1.Action=/MEDIA/VIDEO/XP.switch=I4:O1

7.8.5. Setting an Action by Linking Another Action

Command and Response

- SET·/EVENTS/E<loc>.Action=<event_nr>
- pw·/EVENTS/E<loc>.Action=<event_nr>

Parameters

The <event_nr> means the number (location) of the linked event without letter 'E'.

Example

- SET /EVENTS/E2.Action=1
- pw /EVENTS/E2.Action=1

The Action of the E2 Event is set to be the same as set at E1 Event.

7.8.6. Setting an Action by Linking a Macro

DIFFERENCE: This command is available for SW4-TPS-TX240-Plus only from FW package v1.3.0b6.

Command and Response

- SET·/EVENTS/E<loc>.Action=<macro_name>
- pw·/EVENTS/E<loc>.Action=<macro_name>

Parameters

The <macro_name> means the name of the macro that can be seen in LDC (see the Macros section) or can be queried by the `GET /CTRL/MACROS.<id>` command.

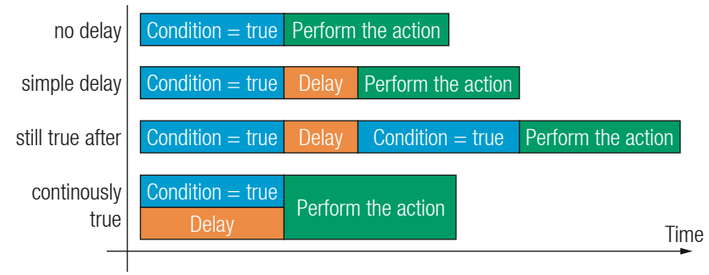
Example

- SET /EVENTS/E1.Action=Macro1
- pw /EVENTS/E2.Action=Macro1

7.9. Event Manager Tool Kit

7.9.1. Setting the Delay

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, thus the following delay options are defined:



Command and Response (summary)

- SET·/EVENTS/E<loc>.ConditionTimeout=<time>
- pw·/EVENTS/E<loc>.ConditionTimeout=<time>
- SET·/EVENTS/E<loc>.ConditionEndCheck=<true/false>
- pw·/EVENTS/E<loc>.ConditionEndCheck=<true/false>
- SET·/EVENTS/E<loc>.ConditionTimeoutContinuous=<true/false>
- pw·/EVENTS/E<loc>.ConditionTimeoutContinuous=<true/false>

Parameters

The <time> parameter means seconds. Set the following properties for the desired delay type:

Delay type	Properties to set	Value	Result
no delay	/EVENTS/E<loc>.ConditionTimeout	**0**	The Action will be lanuched after the Condition is detected.
simple delay	/EVENTS/E<loc>.ConditionTimeout	<time>	If the Condition is detected, the action will be launched after the set time.
still true after	/EVENTS/E<loc>.ConditionTimeout	<time>	The Condition is fulfilled only if is detected after the set time **again**.
	/EVENTS/E<loc>.ConditionEndCheck	**true**	
continuously true	/EVENTS/E<loc>.ConditionTimeout	<time>	The Condition is fulfilled only if it is existing **continuously** during the set time.
	/EVENTS/E<loc>.ConditionEndCheck	**true**	
	/EVENTS/E<loc>.ConditionTimeoutContinuous	**true**	

Example 1 (simple delay)

- SET /EVENTS/E1.ConditionTimeout=10
- pw /EVENTS/E1.ConditionTimeout=10

If the Condition is detected (the **ConditionDetect** property becomes **true**), the **ConditionTimeoutPending** property becomes **true**. 10 seconds later the **ConditionTimeoutPending** property becomes **false,** and the set Action is launched.

Example 2 ('still true after' delay type)

- SET /EVENTS/E1.ConditionTimeout=10
- pw /EVENTS/E1.ConditionTimeout=10
- SET /EVENTS/E1.ConditionTimeoutPending=true
- pw /EVENTS/E1.ConditionTimeoutPending=true

If the Condition is detected (the **ConditionDetect** property becomes **true**), the **ConditionTimeoutPending** property becomes **true**. 10 seconds later the Condition is checked again (the **ConditionTimeoutPending** property becomes **false**). If the Condition can be detected again (the **ConditionDetect** property becomes **true** again), the Condition is fulfilled and the set Action is launched.

Example 3 ('continuously true' delay type)

- SET /EVENTS/E1.ConditionTimeout=10
- pw /EVENTS/E1.ConditionTimeout=10
- SET /EVENTS/E1.ConditionTimeoutContinuous=true
- pw /EVENTS/E1.ConditionTimeoutContinuous=true

If the Condition is detected (the **ConditionDetect** property becomes **true**), the **ConditionTimeoutPending** property becomes **true**. If the Condition can be detected in the following 10 seconds continuously (the **ConditionDetect** property stays **true**), the Condition is fulfilled, the **ConditionTimeoutPending** property becomes **false**, and the set Action is launched.

7.9.2. Setting the Name of the Event

Command and Response

- SET·/EVENTS/E<loc>.Name=<string>
- pw·/EVENTS/E<loc>.Name=<string>

Parameters

The <string> may contain letters (A-Z) and (a-z), numbers (0-9), special characters: hyphen (-), underscore (_), and space ( ) up to 20 characters. Longer string results in an error, unaccepted characters are skipped.

Example

- SET /EVENTS/E1.Name=Projector_ON
- pw /EVENTS/E1.Name=Projector_ON

7.9.3. Enabling/Disabling an Event

Command and Response

- SET·/EVENTS/E<loc>.Enabled=<true/false>
- pw·/EVENTS/E<loc>.Enabled=<true/false>

Parameters

When the property value is **true** (or **1**), the Action will be launched if the Condition is detected. If the property is **false** (or **0**), the Action will not run, however, the Condition counter will be increased when detected.

Example

- SET /EVENTS/E1.Enabled=true
- pw /EVENTS/E1.Enabled=true

7.9.4. Triggering a Condition

DIFFERENCE: This command is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

This feature works like a condition is fulfilled. When a complex control system is built, a Condition may trigger numerous Actions. A typical example is when a system is powered on and the 'ready-to-use' state has to be loaded. In this case, there could be many actions that are based on the same condition. In order to reduce the number of the commands, you can trigger one 'key' condition, which starts the whole process.

Command and Response

- CALL·/EVENTS/E<loc>:triggerCondition(1)
- mO·/EVENTS/E<loc>:triggerCondition

Example

- CALL /EVENTS/E1:triggerCondition(1)
- mo /EVENTS/E1:triggerCondition

The Condition of Event1 is fulfilled, the set Action will be launched (after the delay if set).

7.9.5. Querying the Condition Counter

This property shows how many times the Condition has been detected and triggered altogether. The counter is reset at boot.

Command and Response

- GET·/EVENTS/E<loc>.ConditionCount
- pw·/EVENTS/E<loc>.ConditionCount=<num_value>

Example

- GET /EVENTS/E1.ConditionCount
- pw /EVENTS/E1>.ConditionCount=5

7.9.6. Querying the Condition Trigger Counter

DIFFERENCE: This command is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

This property shows how many times the Condition has been triggered, but does not contain the number of real detections. The counter is reset at boot.

Command and Response

- GET·/EVENTS/E<loc>.ExternalConditionTriggerCount
- pw·/EVENTS/E<loc>.ExternalConditionTriggerCount=<num_value>

Example

- GET /EVENTS/E1.ExternalConditionTriggerCount
- pw /EVENTS/E1.ExternalConditionTriggerCount=2

7.9.7. Testing an Action

This tool is for launching the Action without detecting or triggering the Condition.

Command and Response

- CALL·/EVENTS/E<loc>:ActionTest(1)
- mO·/EVENTS/E<loc>:ActionTest

Example

- CALL /EVENTS/E1:ActionTest(1)
- mO /EVENTS/E1:ActionTest

7.10. Variable-Management

DIFFERENCE: This feature and the commands are available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

Custom variables (30 pcs.) can be defined in number or text format, which are available also in the Event Manager. The maximum length of a variable can be 15 characters and they are stored in a non-volatile memory, thus the value is kept in case of a reboot. The type of the variable (text or string) is determined automatically based on the value. If an operation cannot be performed (e.g. adding number value to a string-type variable), error will be the response. #variables

7.10.1. Value Assignment

Command and Response

- SET·/CTRL/VARS/V<loc>.Value=<value>
- pw·/CTRL/VARS/V<loc>.Value=<value>

Parameters

Parameter	Parameter description	Value	Value description
<loc>	The location of the variable	**1-30**	
<value>	The value of the variable	**Custom**	Length can be max 15 characters. Numeric variable is defined between -2147483648 and 2147483647.

Example

- SET /CTRL/VARS/V1.Value=120
- pw /CTRL/VARS/V1.Value=120

7.10.2. Addition and Subtraction (Add Method)

The value of a numeric variable can be increased by adding a positive value or it can be decreased by adding a negative value. Minimum and maximum values can be defined as limits.

Command and Response

- CALL·/CTRL/VARS/V<loc>:add(<operand>;<min>;<max>)
- mO·/CTRL/VARS/V<loc>:add

Parameters

Parameter	Parameter description	Value	Value description
<loc>	The location of the variable	**1-30**	
<operand>	The value that is added to the variable	**Integer**	Negative value is also accepted
<min>	The lowest allowed value (optional)	**Integer**	Negative value is also accepted
<max>	The highest allowed value (optional)	**Integer**	Negative value is also accepted

If the value of the variable is higher or equals with <max>, the new value will be <max>. Likewise, in case of <min> setting: if the value of the variable is lower or equals with <min>, the new value will be <min>.

Examples

Change messages (CHG) can be seen after each response for the better understanding that are not part of the command, but they can be set as described in the Subscription section.

Example 1 – addition

- GET /CTRL/VARS/V1.Value
- pw /CTRL/VARS/V1.Value=6
- CALL /CTRL/VARS/V1:add(1)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=7
- CALL /CTRL/VARS/V1:add(1)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=8
- CALL /CTRL/VARS/V1:add(2)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=10

Example 2 – subtraction

- GET /CTRL/VARS/V1.Value
- pw /CTRL/VARS/V1.Value=10
- CALL /CTRL/VARS/V1:add(-2)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=8
- CALL /CTRL/VARS/V1:add(-2)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=6
- CALL /CTRL/VARS/V1:add(-10)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=-4

Example 3 – addition with 'max' value

- GET /CTRL/VARS/V1.Value
- pw /CTRL/VARS/V1.Value=16
- CALL /CTRL/VARS/V1:add(2;10;20)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=18
- CALL /CTRL/VARS/V1:add(2;10;20)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=20
- CALL /CTRL/VARS/V1:add(2;10;20)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=20

Example 4 – subtraction with 'min' value

- GET /CTRL/VARS/V1.Value
- pw /CTRL/VARS/V1.Value=14
- CALL /CTRL/VARS/V1:add(-2;10;20)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=12
- CALL /CTRL/VARS/V1:add(-2;10;20)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=10
- CALL /CTRL/VARS/V1:add(-2;10;20)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=10

7.10.3. Addition and Subtraction (Cycle Method)

The value of a numeric variable can be increased by adding a positive value or it can be decreased by adding a negative value. Minimum and maximum values can be defined as limits. This method has the feature that if the value hits the limit (min/max), the value will be stepped to the other end of the interval.

Command and Response

- CALL·/CTRL/VARS/V<loc>:cycle(<operand>;<min>;<max>)
- mO·/CTRL/VARS/V<loc>:cycle

Parameters

Parameter	Parameter description	Value	Value description
<loc>	The location of the variable	**1-30**	
<operand>	The value that is added to the variable	**Integer**	Negative value is also accepted
<min>	The lowest allowed value (optional)	**Integer**	Negative value is also accepted
<max>	The highest allowed value (optional)	**Integer**	Negative value is also accepted

If the calculated value is beyond the limit (min/max), the value will be stepped to the other end of the interval.

Examples

Change messages (CHG) can be seen after each response for the better understanding that are not part of the command, but they can be set as described in the Subscription section.

Example 1 – addition

- GET /CTRL/VARS/V1.Value
- pw /CTRL/VARS/V1.Value=18
- CALL /CTRL/VARS/V1:cycle(1;10;20)
- mO /CTRL/VARS/V1:cycle
- CHG /CTRL/VARS/V1.Value=19
- CALL /CTRL/VARS/V1:cycle(1;10;20)
- mO /CTRL/VARS/V1:cycle
- CHG /CTRL/VARS/V1.Value=20
- CALL /CTRL/VARS/V1:cycle(1;10;20)
- mO /CTRL/VARS/V1:cycle
- CHG /CTRL/VARS/V1.Value=10
- CALL /CTRL/VARS/V1:cycle(1;10;20)
- mO /CTRL/VARS/V1:cycle
- CHG /CTRL/VARS/V1.Value=11

Example 2 – subtraction

- GET /CTRL/VARS/V1.Value
- pw /CTRL/VARS/V1.Value=13
- CALL /CTRL/VARS/V1:cycle(-2;10;20)
- mO /CTRL/VARS/V1:cycle
- CHG /CTRL/VARS/V1.Value=11
- CALL /CTRL/VARS/V1:cycle(-2;10;20)
- mO /CTRL/VARS/V1:cycle
- CHG /CTRL/VARS/V1.Value=20
- CALL /CTRL/VARS/V1:cycle(-2;10;20)
- mO /CTRL/VARS/V1:cycle
- CHG /CTRL/VARS/V1.Value=18

7.10.4. Value Change with Intervals (Case)

This command can be used to change the value of a variable if it fits in any of the defined intervals.

Command and Response

- CALL·/CTRL/VARS/V<loc>:case(<min> <max> <val>;)
- mO·/CTRL/VARS/V<loc>:case

Parameters

Parameter	Parameter description	Value
<loc>	The location of the variable	**1-30**
<min>	The lowest value of the interval	**Integer**
<max>	The highest value of the interval	**Integer**
<val>	The new value that will be valid if the current value is in the interval	**Integer**

The parameters are divided by a space character, and the interval groups are divided by semicolons. Up to 16 cases can be defined.

Examples

- CALL /CTRL/VARS/V1:case(10 20 15)
- mO /CTRL/VARS/V1:case

A typical example is when two different ranges of values have to meet. Incoming values: between 0 and 255 (e.g. the slider of a controller can have these values); Outgoing values: between 0 and 100 (e.g. the controlled device accepts these values). Defined cases:

	Min	Max	New value
Case 1	1	25	10
Case 2	26	50	20
Case 3	51	75	30
Case 4	76	100	40
Case 5	101	125	50
Case 6	126	150	60
Case 7	151	175	70
Case 8	176	200	80
Case 9	201	225	90
Case 10	226	255	100

The command looks like:

- CALL /CTRL/VARS/V1:case(1 25 10;26 50 20;51 75 30;76 100 40;101 125 50;126 150 60;151 175 70; 176 200 80; 201 225 90; 226 255 100)
- mO /CTRL/VARS/V1:case

7.10.5. Scan and Store

This command can be used to get the value (or a part of the value) of an LW3 property. The defined path will be scanned according to the pattern, and the result will be the value of the variable (number or string type).

Command and Response

- CALL·/CTRL/VARS/V<loc>:scanf(<path>.<property>;<pattern>)
- mO·/CTRL/VARS/V<loc>:scanf

Parameters

Parameter	Parameter description	Value
<loc>	The location of the variable	**1-30**
<path>.<property>	The LW3 property with node	
<pattern>	The pattern that scans the property for the desired result	**see below**

Pattern options

Pattern	Pattern description
%s	String of characters stopping at the first whitespace character
%<number>s	The next <number> of characters (string) stopping at the first whitespace
%c	One character
%<number>c	The next <number> of characters
%[<characters>]	Defined characterset, specified between brackets
%[^<characters>]	Negated characterset, specified between brackets which will be skipped
%*	Ignored part
<custom_text>	User-defined text

The patterns can be combined to get the desired result as shown in the examples.

ATTENTION! Do not forget to escape the % character as shown in the example below.

Examples

- CALL /CTRL/VARS/V1:scanf(/MEDIA/AUDIO/XP.SourcePortStatus;\%5c)
- mO /CTRL/VARS/V1:scanf
- GET /CTRL/VARS/V1.Value
- pw /CTRL/VARS/V1.Value=T00AA

A simple pattern has been applied: we need the first five characters from the property value.

Further Examples

<path>.<property>	Property Value	<pattern>	Scanned result
/MANAGEMENT/STATUS.CpuTemperature	42 C; 0;75; 0;7	%s	42
/MANAGEMENT/STATUS.CpuFirmware	1.3.0b3 r32	%12s	1.3.0b3
/MEDIA/VIDEO/XP.DestinationPortStatus	T00AA;T00AF	%6c	T00AA
/MEDIA/UART/P1.Rs232Configuration	57600, 8N1	%*[^,], %s	8N1
/MEDIA/AUDIO/XP.SourcePortStatus	T000A;T000B;T000F	%*6c%5c	T000B
/MANAGEMENT/NETWORK.HostName	lightware-00005031	lightware-%[0-9]	00005031

7.10.6. Reformatting a Value

The value of the variable can be changed by adding text as prefix and/or postfix.

ATTENTION! Think about the length of the value: 15 characters are allowed, the others are truncated.

Command and Response

- CALL·/CTRL/VARS/V<loc>:printf(<prefix>%s<postfix>)
- mO·/CTRL/VARS/V<loc>:printf

Parameters

Parameter	Parameter description	Value	Value description
<loc>	The location of the variable	**1-30**	
<prefix>	The text before the original value of the property (optional)	**Custom**	ASCII characters
%s	The original value of the variable		
<postfix>	The text following the original value of the property (optional)	**Custom**	ASCII characters

Example

- GET /CTRL/VARS/V1.Value
- pw /CTRL/VARS/V1.Value=01
- CALL /CTRL/VARS/V1:printf(PWR%s)
- mO /CTRL/VARS/V1:printf
- GET /CTRL/VARS/V1.Value
- pw /CTRL/VARS/V1.Value=PWR01

The 'PWR' string has been inserted before the original value.

7.11. Ethernet Port Configuration

7.11.1. Setting the DHCP State

> **ATTENTION!** When you change a network property, the new value is stored, but the **applySettings** method must always be called to apply the new settings. When two or more network parameters are changed, the **applySettings** method is enough to call once as a final step.

Command and Response *#dhcp #network #ipaddress*

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

Parameters

If the <dhcp_status> parameter is **true**, the current IP address setting is DHCP, if the parameter is **false**, the current IP address is static.

Example

- SET /MANAGEMENT/NETWORK.DhcpEnabled=true
- pw /MANAGEMENT/NETWORK.DhcpEnabled=true
- CALL /MANAGEMENT/NETWORK:applySettings(1)
- mO /MANAGEMENT/NETWORK:applySettings

> INFO: The **applySettings** method will save and apply the new value and reboot the device.

> INFO: The current setting can be queried using the GET command.

7.11.2. Changing the IP Address (Static)

Command and Response

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

Example

- SET /MANAGEMENT/NETWORK.StaticIpAddress=192.168.0.85
- pw /MANAGEMENT/NETWORK.StaticIpAddress=192.168.0.85
- CALL /MANAGEMENT/NETWORK:applySettings(1)
- mO /MANAGEMENT/NETWORK:applySettings

> INFO: The **applySettings** method will save and apply the new value and reboot the device.

> INFO: The current setting can be queried using the GET command.

7.11.3. Changing the Subnet Mask (Static)

Command and Response *#ipaddress*

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

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 will save and apply the new value and reboot the device.

> INFO: The current setting can be queried using the GET command.

7.11.4. Changing the Gateway Address (Static)

Command and Response

- SET·/MANAGEMENT/NETWORK.StaticGatewayAddress=<gw_address>
- pw·/MANAGEMENT/NETWORK.StaticGatewayAddress=<gw_address>

Example

- SET /MANAGEMENT/NETWORK.StaticGatewayAddress=192.168.0.5
- pw /MANAGEMENT/NETWORK.StaticGatewayAddress=192.168.0.5
- CALL /MANAGEMENT/NETWORK:applySettings(1)
- mO /MANAGEMENT/NETWORK:applySettings

> INFO: The **applySettings** method will save and apply the new value and reboot the device.

> INFO: The current setting can be queried using the GET command.

7.11.5. Applying Network Settings

Command and Response

- CALL·/MANAGEMENT/NETWORK:ApplySettings()
- m0·/MANAGEMENT/NETWORK:ApplySettings

Example

- CALL /MANAGEMENT/NETWORK:ApplySettings()
- m0 /MANAGEMENT/NETWORK:ApplySettings

All network settings that have been changed are applied and network interface restarts.

7.12. Ethernet Tool Kit

7.12.1. Device Filter Based on MAC Address

DIFFERENCE: This command is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

You can create a list of network devices based on the MAC address that are allowed controlling the device, or querying parameters to/from the Lightware device. *#macfilter*

ATTENTION! If the device is installed in a network where it gets the IP address from a DHCP server and you plan to use the MAC filtering, make sure the MAC address of the DHCP server is added to the whitelist. Otherwise, the device will not get an IP address and will be unreachable.

Command and Response

- SET·/MANAGEMENT/MACFILTER.MACaddress<loc>=<MAC_address>;<receive>;<send>;<name>
- pw·/MANAGEMENT/MACFILTER.MACaddress<loc>=<MAC_address>;<receive>;<send>;<name>

The filter is disabled by default. Set the **FilterEnable** property to **true** as shown in the example.

Parameters

Parameter	Parameter description	Values	Value description
<loc>	Location of the address	**1-8**	The default values of **1, 2** and **3** ensure that address resolution and device discovery continue to work after enabling the MAC filter
<MAC_address>	The MAC address of the device	Unique value	Hex format, divided by a colon
<receive>	Enable/disable the parameter querying option	**false** (or **0**)	The device is **not allowed** to query parameters from the LW device
		true (or **1**)	The device is **allowed** to query parameters from the LW device
<send>	Enable/disable the parameter setting option	**false** (or **0**)	The device is **not allowed** to change parameters in the LW device
		true (or **1**)	The device is **allowed** to change parameters in the LW device
<name>	Unique name for the better identification (optional)	Any string	Up to 5 ASCII characters (longer names are truncated)

Example

- SET /MANAGEMENT/MACFILTER/MACaddress4=(04:D4:C4:4D:01:43;1;1;Tech)
- pw /MANAGEMENT/MACFILTER/MACaddress4=(04:D4:C4:4D:01:43;1;1;Tech)
- SET /MANAGEMENT/MACFILTER.FilterEnable=true
- pw /MANAGEMENT/MACFILTER.FilterEnable=true

New MAC address is saved into the 4th property with the name 'Tech', which may query/set parameters from/in the Lightware device. The **FilterEnable** property is set to **true**, thus the filter is enabled.

7.12.2. LW2 Control Port Blocking

DIFFERENCE: This command is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

This command is for blocking the LW2 control port; it is an additional protection for the Cleartext login function.

Command and Response *#portblock*

- SET·/MANAGEMENT/SERVICEFILTER.Lw2Enabled=<port_mode>
- pw·/MANAGEMENT/SERVICEFILTER.Lw2Enabled=<port_mode>

Example

- SET /MANAGEMENT/SERVICEFILTER.Lw2Enabled=false
- pw /MANAGEMENT/SERVICEFILTER.Lw2Enabled=false

7.12.3. HTTP Port Blocking

DIFFERENCE: This command is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

This command is for blocking the HTTP port (80); it is an additional protection for the Cleartext login function.

Command and Response

- SET·/MANAGEMENT/SERVICEFILTER.HttpEnabled=<port_mode>
- pw·/MANAGEMENT/SERVICEFILTER.HttpEnabled=<port_mode>

Example

- SET /MANAGEMENT/SERVICEFILTER.HttpEnabled=true
- pw /MANAGEMENT/SERVICEFILTER.HttpEnabled=true

7.12.4. HTTP Post Receiving Blocking

DIFFERENCE: This command is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

This command is for blocking HTTP posts; it is an additional protection for the Cleartext login function.

Command and Response

- SET·/MANAGEMENT/SERVICEFILTER.HttpEnabled=<port_mode>
- pw·/MANAGEMENT/SERVICEFILTER.HttpEnabled=<port_mode>

Example

- SET /MANAGEMENT/SERVICEFILTER.HttpEnabled=true
- pw /MANAGEMENT/SERVICEFILTER.HttpEnabled=true

7.12.5. Powering on a Computer over Ethernet (Wake-on-LAN)

DIFFERENCE: This command is available only from FW package v1.3.0b6.

The well-known wake-on-lan feature (sending a magic Packet to the target PC) is available via the following command:

Command and Response

- CALL·/MEDIA/ETHERNET:wakeOnLan(MAC_address)
- mO·/MEDIA/ETHERNET:wakeOnLan

Example

- CALL /MEDIA/ETHERNET:wakeOnLan(AA:BB:CC:22:14:FF)
- mO /MEDIA/ETHERNET:wakeOnLan

Please make sure the feature is enabled in the target PC and it is powered (but switched off).

7.12.6. Setting the Host Name

DIFFERENCE: This command is available only from FW package v1.3.0b6.

The host name is a property that can be used instead of the IP address when connecting to the device. It is also suitable for finding in the Device Discovery window of the LDC, see more details in the Add New Favorite Device section. Furthermore, it can be used to open The Miniweb Room Control. If the IP address of the device is changing, the host name can be used as a fixed property.

Command and Response

- SET·/MANAGEMENT/NETWORK.HostName=<unique_name>
- pw·/MANAGEMENT/NETWORK.HostName=<unique_name>

Parameters

The <unique_name> can be 1-64 characters long and the following are allowed when naming: the elements of the English alphabet and numbers. Hyphen (-) and dot (.) are also accepted, except as last character.

Example

- SET /MANAGEMENT/NETWORK.HostName=mtg-room1
- pw /MANAGEMENT/NETWORK.HostName=mtg-room1

7.13. Ethernet Message Sending

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.

7.13.1. Sending a TCP Message (ASCII-format)

The command is for sending a command message in ASCII-format. This method allows escaping the control characters. For more information, see the Escaping section.

Command and Response

- CALL·/MEDIA/ETHERNET:tcpMessage(<IP_address>:<port_no>=<message>)
- mO·/MEDIA/ETHERNET:tcpMessage

Example

- CALL /MEDIA/ETHERNET:tcpMessage(192.168.0.103:6107=C00)
- mO /MEDIA/ETHERNET:tcpMessage

The 'C00' message is sent to the indicated IP:port address.

Example with HEX codes

- CALL /MEDIA/ETHERNET:tcpMessage(192.168.0.20:5555=C00\x0a\x0d)
- mO /MEDIA/ETHERNET:tcpMessage

The 'C00' message with CrLf (Carriage return and Line feed) is sent to the indicated IP:port address. The \x sequence indicates the HEXA code; see more information in the Escaping section.

7.13.2. Sending a TCP Text (ASCII-format)

The command is for sending a text message in ASCII-format. This method **does not allow** escaping or inserting control characters.

Command and Response

- CALL·/MEDIA/ETHERNET:tcpText(<IP_address>:<port_no>=<text>)
- mO·/MEDIA/ETHERNET:tcpText

Example

- CALL /MEDIA/ETHERNET:tcpText(192.168.0.103:6107=pwr_on)
- mO /MEDIA/ETHERNET:tcpText

The 'pwr_on' text is sent to the indicated IP:port address.

7.13.3. Sending a TCP Binary Message (HEX-format)

The command is for sending a binary message in Hexadecimal format. This method **does not require** escaping the control and non-printable characters.

Command and Response

- CALL·/MEDIA/ETHERNET.tcpBinary(<IP_address>:<port_no>=<HEX_message>)
- mO·/MEDIA/ETHERNET:tcpBinary

Example

- CALL /MEDIA/ETHERNET:tcpBinary(192.168.0.103:6107=0100000061620000cdcc2c40)
- mO /MEDIA/ETHERNET:tcpBinary

The '0100000061620000cdcc2c40' message is sent to the indicated IP:port address.

INFO: There is no need to insert a space or other separator character between the binary messages.

7.13.4. Sending a UDP Message (ASCII-format)

The command is for sending a UDP message in ASCII-format. This method allows escaping the control characters. For more information, see the Escaping section.

Command and Response

- CALL·/MEDIA/ETHERNET:udpMessage(<IP_address>:<port_no>=<message>)
- mO·/MEDIA/ETHERNET:udpMessage

Example

- CALL /MEDIA/ETHERNET:udpMessage(192.168.0.103:6107=C00)
- mO /MEDIA/ETHERNET:udpMessage

The 'C00' message is sent to the indicated IP:port address.

Example with HEX codes

- CALL /MEDIA/ETHERNET:udpMessage(192.168.0.20:9988=C00\x0a\x0d)
- mO /MEDIA/ETHERNET:udpMessage

The 'C00' message with CrLf (Carriage return and Line feed) is sent to the indicated IP:port address. The \x sequence indicates the HEXA code; see more information in the Escaping section.

7.13.5. Sending a UDP Text (ASCII-format)

The command is for sending a text message in ASCII-format via UDP-protocol. This method **does not allow** escaping or inserting control characters.

Command and Response

- CALL·/MEDIA/ETHERNET:udpText(<IP_address>:<port_no>=<text>)
- mO·/MEDIA/ETHERNET:udpText

Example

- CALL /MEDIA/ETHERNET:udpText(192.168.0.20:9988=open)
- mO /MEDIA/ETHERNET:udpText

The 'open' text is sent to the indicated IP:port address.

7.13.6. Sending a UDP Binary Message (HEX-format)

The command is for sending a binary message in Hexadecimal format. This method **does not require** escaping the control and non-printable characters.

Command and Response

- CALL·/MEDIA/ETHERNET:udpBinary(<IP_address>:<port_no>=<HEX_message>)
- mO·/MEDIA/ETHERNET:udpBinary

Example

- CALL /MEDIA/ETHERNET:udpBinary(192.168.0.20:9988=433030)
- mO /MEDIA/ETHERNET:udpBinary

The '433030' message is sent to the indicated IP:port address.

INFO: There is no need to insert a space or other separator character between the binary messages.

7.14. HTTP Messaging

DIFFERENCE: The features and commands below are available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

Http **post** and **put** messages can be sent from the Lightware device for more integration with third-party devices. *#http*

ATTENTION! This feature means posting or putting **HTTP** messages from the Lightware device to another device. Encrypted transmission (**HTTPS**) is not supported.

7.14.1. Setting the Target IP Address

Command and Response

- SET·/CTRL/HTTP/C1.ServerIP=<IP_address>
- pw·/CTRL/HTTP/C1.ServerIP=<IP_address>

Example

- SET /CTRL/HTTP/C1.ServerIP=192.168.0.220
- pw /CTRL/HTTP/C1.ServerIP=192.168.0.220

7.14.2. Setting the TCP Port

Command and Response

- SET·/CTRL/HTTP/C1.ServerPort=<port_no>
- pw·/CTRL/HTTP/C1.ServerPort=<port_no>

Example

- SET /CTRL/HTTP/C1.ServerPort=80
- pw /CTRL/HTTP/C1.ServerIP=80

7.14.3. Setting the Target Path

This property sets the path in the target device where the post/put message is to be sent.

Command and Response

- SET·/CTRL/HTTP/C1.File=<path>
- pw·/CTRL/HTTP/C1.File=<path>

Example

- SET /CTRL/HTTP/C1.File=/putxml
- pw /CTRL/HTTP/C1.File=/putxml

7.14.4. Setting the Message Header

Command and Response

- SET·/CTRL/HTTP/C1.Header=<header_text>
- pw·/CTRL/HTTP/C1.Header=<header_text>

Example

- SET /CTRL/HTTP/C1.Header=Host: 192.168.0.220\r\nContent-Type: text/xml\r\nAuthorization: Basic YWRtaW46TGlnaHR3YXJlMDE=
- pw /CTRL/HTTP/C1.Header=Host: 192.168.0.220\r\nContent-Type: text/xml\r\nAuthorization: Basic YWRtaW46TGlnaHR3YXJlMDE=

7.14.5. Sending a Post Message

Command and Response

- CALL·/CTRL/HTTP/C1:post(<body_text>)
- mO·/CTRL/HTTP/C1:post

Example

- CALL /CTRL/HTTP/C1:post(<Command><Message><Send><Text>LI1R_P</Text></Send></Message></Command>)
- mO /CTRL/HTTP/C1:post

7.14.6. Sending a Put Message

Command and Response

- CALL·/CTRL/HTTP/C1:put(<body_text>)
- mO·/CTRL/HTTP/C1:put

Example

- CALL /CTRL/HTTP/C1:put(<Command><Message><Send><Text>LI1R_P</Text></Send></Message></Command>)
- mO /CTRL/HTTP/C1:put

7.15. TCP Message Recognizer

DIFFERENCE: The features and commands below are available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

This tool can be used to recognize messages coming from a TCP server. You can link an immediate event Action that is run when a message is recognized, but you can also use it in Event manager.

#tcprecognizer *#message*

Preparation

Step 1. Set a TCP client in the Lightware device (three TCP clients can be run at the same time), set the properties of the target TCP server.

Step 2. Set the **DelimiterHex** and the **TimeOut** settings for the proper message processing

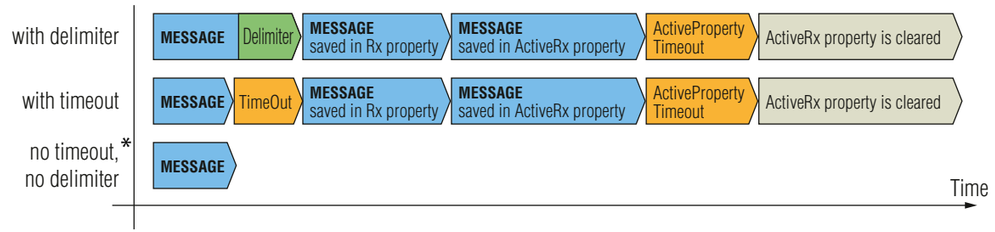
Step 3. Make sure the TCP/IP port is opened in the target device (think about Firewall settings in the network).

Step 4. Connect to the TCP server.

Working Method

A message got recognized from the incoming data, if one of the following occurs:

- The set **DelimiterHex** is detected in the message, or
- The set **TimeOut** has passed since receiving the last data bit.



* In that case, the not-recognized data is kept in the memory (up to 128 bytes). If the **DelimiterHex** is detected later, or the **TimeOut** parameter is set meanwhile, the data appears in the **Rx**, **RxHex, Hash** and **ActiveRx**, **ActiveRxHex, ActiveRxHash** properties.

7.15.1. Setting the IP Address of the TCP Server

Command and Response

- SET·/CTRL/TCP/C<loc>.ServerIP(<IP_address>)
- pw·/CTRL/TCP/C<loc>.ServerIP(<IP_address>)

Parameters

The <loc> parameter can be 1, 2 or 3, as at most three TCP connections can be established at the same time.

Example

- SET /CTRL/TCP/C1.ServerIP(192.168.1.14)
- pw /CTRL/TCP/C1.ServerIP(192.168.1.14)

7.15.2. Setting the TCP/IP Port Number of the TCP Server

Command and Response

- SET·/CTRL/TCP/C<loc>.ServerPort(<port_no>)
- pw·/CTRL/TCP/C<loc>.ServerPort(<port_no>)

Example

- SET /CTRL/TCP/C1.ServerPort(4999)
- pw /CTRL/TCP/C1.ServerPort(4999)

7.15.3. Connecting to a TCP Server

Command and Response

- CALL·/CTRL/TCP/C<loc>:connect()
- mO·/CTRL/TCP/C<loc>:connect

Example

- CALL /CTRL/TCP/C1:connect()
- mO /CTRL/TCP/C1:connect

7.15.4. Disconnecting from a TCP Server

Command and Response

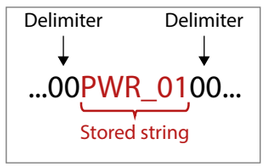
- CALL·/CTRL/TCP/C<loc>:disconnect()
- mO·/CTRL/TCP/C<loc>:disconnect

Example

- CALL /CTRL/TCP/C1:disconnect()
- mO /CTRL/TCP/C1:disconnect

7.15.5. Setting the Delimiter Hex

This property stores the delimiter that is between the messages (e.g. Cr, Lf, Space). The value has to be in hex format (e.g.0D, 0A, 20).



Command and Response

- SET·/CTRL/TCP/C<loc>.DelimiterHex=<delimiter>
- pw·/CTRL/TCP/C<loc>.DelimiterHex=<delimiter>

Parameters

The <delimiter> parameter can be max. 8 characters long (16 hex digits) in hex format.

Example

- SET /CTRL/TCP/C1.DelimiterHex=00
- pw /CTRL/TCP/C1.DelimiterHex=00

7.15.6. Setting the Timeout

When the set time has passed after the last received message and delimiter was not detected, the device saves the data into the **Rx, RxHex, Hash** properties. The timeout setting is useful if there is no special or easily defined delimiter in the incoming data, but there is a time gap between the messages.

Command and Response

- SET·/CTRL/TCP/C<loc>.TimeOut=<timeout>
- pw·/CTRL/TCP/C<loc>.TimeOut=<timeout>

Parameters

The <timeout> parameter sets the time value in milliseconds: **0** means the timeout is disabled, min. value is 10.

Example

- SET /CTRL/TCP/C1.TimeOut=20
- pw /CTRL/TCP/C1.TimeOut=20

7.15.7. Querying the Last Recognized Message (String)

The recognized message is stored as a string in the property below until the next recognized message or until the **clear()** method is called.

> TIPS AND TRICKS: When this property is set as a condition in the Event Manager, and the same strings follow each other, the action **will execute once**. (A Condition can be detected in Event Manager if a change happens. But if the same string is saved into the property after each other, it will not cause a change.)

Command and Response

- GET·/CTRL/TCP/C<loc>.Rx
- pr·/CTRL/TCP/C<loc>.Rx=<recognized_string>

Parameters

The <recognized_string> parameter can be max. 128 bytes long.

Example

- GET /CTRL/TCP/C1.Rx
- pr /CTRL/TCP/C1.Rx=PWR_off

7.15.8. Querying the Last Recognized Message (Hex)

The recognized message is stored as a hex message in the property below until the next recognized message or until the **clear()** method is called.

Command and Response

- GET·/CTRL/TCP/C<loc>.RxHex
- pr·/CTRL/TCP/C<loc>.RxHex=<recognized_hex_data>

Example

- GET /CTRL/TCP/C1.RxHex
- pr /CTRL/TCP/C1.RxHex=5057525F6F6666

7.15.9. Clearing the Last Recognized Stored Message

This method clears the stored recognized messages from **Rx**, **RxHex** and **Hash** properties.

Command and Response

- CALL·/CTRL/TCP/C<loc>:clear()
- mO·/CTRL/TCP/C<loc>:clear

Example

- CALL /CTRL/TCP/C1:clear()
- mO /CTRL/TCP/C1:clear

7.15.10. Querying the Last Recognized Active Message (String)

The recognized data is stored in string in the property below **temporarily**. When the time set in the **ActiveTimeout** property has passed, the property is cleared.

> TIPS AND TRICKS: When this property is set as a condition in the Event Manager, and the same strings follow each other, the action **will execute every occasion.** (A Condition can be detected in Event Manager if a change happens. In this case, the string is stored in the property, and after the **ActiveTimeout** it will be cleared. If the same string is saved into the (empty) property, it will cause a change.)

Command and Response

- GET·/CTRL/TCP/C<loc>.ActiveRx
- pr·/CTRL/TCP/C<loc>.ActiveRx=<recognized_string>

Parameters

The <recognized_string> parameter is a max. 12-byte-long recognized data string.

Example

- GET /CTRL/TCP/C1.ActiveRx
- pr /CTRL/TCP/C1.ActiveRx=AudOut+

> INFO: Please note that the property contains the string until the **ActivePropertyTimeout** has passed only.

7.15.11. Querying the Last Recognized Active Message (Hex)

Command and Response

- GET·/CTRL/TCP/C<loc>.ActiveRxHex
- pr·/CTRL/TCP/C<loc>.ActiveRxHex=<recognized_hex>

Parameters

The <recognized_hex> parameter is the recognized data in hex format.

Example

- GET /CTRL/TCP/C1.ActiveRxHex
- pr /CTRL/TCP/C1.ActiveRxHex=4175644F75742B00

INFO: Please note that the property contains the data until the **ActivePropertyTimeout** has passed only.

7.15.12. Setting the Active Timeout

This property is responsible for clearing the **ActiveRx**, **ActiveRxHex**, **ActiveHash** properties after the elapsed time. Default value is 50ms.

Command and Response

- SET·/CTRL/TCP/C<loc>.ActivePropertyTimeout=<a_timeout>
- pw·/CTRL/TCP/C<loc>.ActivePropertyTimeout=<a_timeout>

Parameters

The <a_timeout> parameter is the active timeout value (ms) between 0 and 255.

Example

- SET /CTRL/TCP/C1.ActivePropertyTimeout=255
- pw /CTRL/TCP/C1.ActivePropertyTimeout=255

7.15.13. Running an Immediate Event Action

When a message is recognized (DelimiterHex is detected in the message, or TimeOut has passed since receiving the last data bit), a specific Action of an Event can be run by the following command.

Command and Response

- SET·/CTRL/TCP/C<loc>.ActionTrigger=<event_nr>
- pw·/CTRL/TCP/C<loc>.ActionTrigger=<event_nr>

Parameters

The <event_nr> means the number (location) of the linked Event Action without letter 'E'. (There is no need to define a Condition in the linked Event.)

Example

- SET /CTRL/TCP/C1.ActivePropertyTimeout=255
- pw /CTRL/TCP/C1.ActivePropertyTimeout=255

7.16. RS-232 Port Configuration

ATTENTION! The commands listed below 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.

7.16.1. 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

7.16.2. 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

7.16.3. 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

7.16.4. 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

7.16.5. 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

7.16.6. 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.

7.16.7. 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

7.17. RS-232 Message Sending

7.17.1. Sending a Message (ASCII-format) via RS-232

The command is for sending a command message in ASCII-format. This method **allows** escaping the control characters. For more information, see the Escaping section.

Command and Response *#message*

- CALL·/MEDIA/UART/P1:sendMessage(<message>)
- mO·/MEDIA/UART/P1:sendMessage

Example

- CALL /MEDIA/UART/P1:sendMessage(PWR0)
- mO /MEDIA/UART/P1:sendMessage

The 'PWR0' message is sent out via the P1 serial port.

7.17.2. Sending a Text (ASCII-format) via RS-232

The command is for sending a command message in ASCII-format. This method **does not require** escaping the control and non-printable characters.

Command and Response

- CALL·/MEDIA/UART/P1:sendText(<message>)
- mO·/MEDIA/UART/P1:sendText

Example

- CALL /MEDIA/UART/P1:sendText(open)
- mO /MEDIA/UART/P1:sendText

The 'open' text is sent out via the P1 serial port.

7.17.3. Sending a Binary Message (HEX-format) via RS-232

The command is for sending a binary message in Hexadecimal format. This method **does not require** escaping the control and non-printable characters.

Command and Response

- CALL·/MEDIA/UART/P1:sendBinaryMessage(<message>)
- mO·/MEDIA/UART/P1:sendBinaryMessage

Example

- CALL /MEDIA/UART/P1:sendBinaryMessage(433030)
- mO /MEDIA/UART/P1:sendBinaryMessage

The '433030' message is sent out via the P1 serial port.

7.17.4. Using Hexadecimal Codes

Hexadecimal codes can be inserted in the ASCII message when using:

sendMessage command: `CALL /MEDIA/UART/P1:sendMessage(C00\x0D)`

tcpMessage command: `CALL /MEDIA/ETHERNET:tcpMessage(C00\x0D)`

udpMessage command: `CALL /MEDIA/ETHERNET:udpMessage(C00\x0D)`

- **C00**: the message.
- **\x**: indicates that the following is a hexadecimal code.
- **0D**: the hexadecimal code (Carriage Return).

7.18. RS-232 Message Recognizer

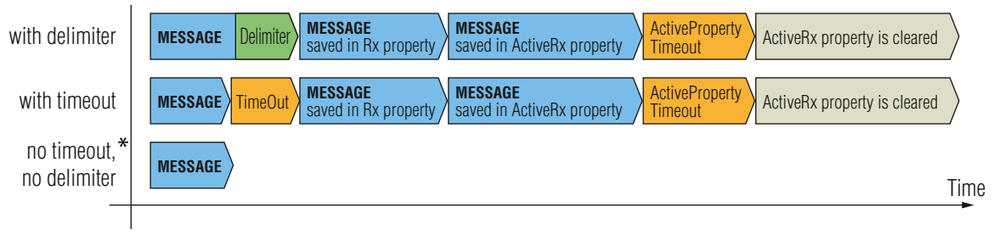
DIFFERENCE: This command is available only for SW4-TPS-TX240-Plus from FW package v1.2.0b16.

This tool can be used to recognize messages coming from the RS-232 port. The message can be used as a Condition in Event manager and an Action can be defined for it.

Working Method

A message got recognized from the incoming data if one of the following occurs:

- The set DelimiterHex is detected in the message, or
- The set TimeOut has passed since receiving the last data bit.



* In that case, the not-recognized data is kept in the memory (up to 128 bytes). If the **DelimiterHex** is detected later, or the **TimeOut** parameter is set in the meantime, the data appears in the **Rx**, **RxHex, Hash** and **ActiveRx**, **ActiveRxHex, ActiveRxHash** properties.

7.18.1. Enabling/Disabling the Recognizer

Command and Response

- SET·/MEDIA/UART/<serial_port>.RecognizerEnable=<recognizer_enable>
- pw·/MEDIA/UART/<serial_port>.RecognizerEnable=<recognizer_enable>

Parameters

Parameter	Parameter description	Values	Value description
<serial_port>	Serial port number	**P1, P2**	
<recognizer_enable>	Recognizer mode	**true**	Recognizer is enabled
		false	Recognizer is disabled

Example

- SET /MEDIA/UART/P1.RecognizerEnable=true
- pw /MEDIA/UART/P1.RecognizerEnable=true

#recognizer *#rs232recognizer* *#rs-232recognizer*

7.18.2. Setting the Delimiter Hex

This property stores the delimiter that is between the messages (e.g. Cr, Lf, Space). The value has to be in hex format (e.g.0D, 0A, 20).

Command and Response

- SET·/MEDIA/UART/RECOGNIZER.DelimiterHex=<delimiter>
- pw·/MEDIA/UART/RECOGNIZER.DelimiterHex=<delimiter>

Parameters

The <delimiter> parameter can be max. 8 characters long (or 16 hex digits) in **hex** format.

Example

- SET /MEDIA/UART/RECOGNIZER.DelimiterHex=3a
- pw /MEDIA/UART/RECOGNIZER.DelimiterHex=3a

7.18.3. Setting the Timeout

When the set time has passed after the last received message and delimiter was not detected, the device saves the data into the **Rx, RxHex, Hash** properties. The timeout setting is useful if there is no special or easily defined delimiter in the incoming data, but there is a time gap between the messages.

Command and Response

- SET·/MEDIA/UART/RECOGNIZER.TimeOut=<timeout>
- pw·/MEDIA/UART/RECOGNIZER.TimeOut=<timeout>

Parameters

The <timeout> parameter sets the timeout value in milliseconds: **0** means the timeout is disabled, min. value is 10.

Example

- SET /MEDIA/UART/RECOGNIZER.TimeOut=20
- pw /MEDIA/UART/RECOGNIZER.TimeOut=20

7.18.4. Querying the Last Recognized Message (String)

The recognized message is stored as a string in the property below until the next recognized message or until the **RECOGNIZER.clear()** method is called.

> TIPS AND TRICKS: When this property is set as a condition in the Event Manager, and the same strings follow each other, the action **will execute once**. (A Condition can be detected in Event Manager if a change happens. But if the same string is saved into the property after each other, it will not cause a change.)

Command and Response

- GET·/MEDIA/UART/RECOGNIZER.Rx
- pr·/MEDIA/UART/RECOGNIZER.Rx=<recognized_string>

Parameters

The <recognized_string> parameter can be a max. 12-byte-long recognized data string.

Example

- GET /MEDIA/UART/RECOGNIZER.Rx
- pr /MEDIA/UART/RECOGNIZER.Rx=Login:

7.18.5. Querying the Last Recognized Message(Hex)

Command and Response

- GET·/MEDIA/UART/RECOGNIZER.RxHex
- pr·/MEDIA/UART/RECOGNIZER.RxHex=<recognized_hex>

Parameters

The <recognized_hex> parameter is the recognized data in hex format.

Example

- GET /MEDIA/UART/RECOGNIZER.RxHex
- pr /MEDIA/UART/RECOGNIZER.RxHex=FF1F4C6F67696E3A

7.18.6. Clearing the Last Recognized Stored Message

This method deletes all the stored received serial messages.

Command and Response

- CALL·/MEDIA/UART/RECOGNIZER:clear()
- mO·/MEDIA/UART/RECOGNIZER:clear

Example

- CALL /MEDIA/UART/RECOGNIZER:clear()
- mO /MEDIA/UART/RECOGNIZER:clear

7.18.7. Querying the Last Recognized Active Message (String)

The recognized data is stored in string in the property below **temporarily**. When the time set in the **ActiveTimeout** property has passed, the property is cleared.

> TIPS AND TRICKS: When this property is set as a condition in the Event Manager, and the same strings follow each other, the action **will execute every occasion.** (A Condition can be detected in Event Manager if a change happens. In this case the string is stored in the property, and after the **ActiveTimeout** it will be cleared. If the same string is saved into the (empty) property, it will cause a change.)

Command and Response

- GET·/MEDIA/UART/RECOGNIZER.ActiveRx
- pr·/MEDIA/UART/RECOGNIZER.ActiveRx=<recognized_string>

Parameters

The <recognized_string> parameter is a max. 12-byte-long recognized data string.

Example

- GET /MEDIA/UART/RECOGNIZER.ActiveRx
- pr /MEDIA/UART/RECOGNIZER.ActiveRx=Login:

7.18.8. Querying the Last Recognized Active Message (Hex)

Command and Response

- GET·/MEDIA/UART/RECOGNIZER.ActiveRxHex
- pr·/MEDIA/UART/RECOGNIZER.ActiveRxHex=<recognized_hex>

Parameters

The <recognized_hex> parameter is the recognized data in hex format.

Example

- GET /MEDIA/UART/RECOGNIZER.ActiveRxHex
- pr /MEDIA/UART/RECOGNIZER.ActiveRxHex= 4C6F67696E3A

7.18.9. Setting the Active Timeout

This property is responsible for clearing the **ActiveRx**, **ActiveRxHex**, **ActiveHash** properties after the elapsed time. Default value is 50ms.

Command and Response

- SET·/MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=<a_timeout>
- pw·/MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=<a_timeout>

Parameters

The <a_timeout> parameter is the active timeout value (ms) between 0 and 255.

Example

- SET /MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=255
- pw /MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=255

7.18.10. Running an Immediate Event Action

DIFFERENCE: This command is available from firmware v1.3.0b6.

When a message is recognized (DelimiterHex is detected in the message, or TimeOut has passed since receiving the last data bit) a specific Action of an Event can be run via the following command.

Command and Response

- SET·/CTRL/TCP/C<loc>.ActionTrigger=<event_nr>
- pw·/CTRL/TCP/C<loc>.ActionTrigger=<event_nr>

Parameters

The <event_nr> means the number (location) of the linked Event Action without letter 'E'. (There is no need to define a Condition in the linked Event.)

Example

- SET /CTRL/TCP/C1.ActivePropertyTimeout=255
- pw /CTRL/TCP/C1.ActivePropertyTimeout=255

7.19. CEC Command Sending

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.2.0b16.

INFO: According to the standard, the CEC feature works only at HDMI ports.

The device is able to send and receive Consumer Electronics Control (CEC) commands. This feature is for remote controlling the source or sink device. CEC is a bi-directional communication via a HDMI cable.

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). #cec

7.19.1. Press&Release Commands

DIFFERENCE: This command is available only for SW4-TPS-TX240-Plus from FW package v1.3.0b6.

The CEC commands below are called 'push-button commands' like a button in a remote controller, e.g. volume up/down. When the CEC command is sent, the 'release' command is also sent in the background. Certain devices require this feature for the proper working, but this is necessary only for push-button commands.

Command and Response

- CALL·/MEDIA/CEC/<port>:sendClick(<command>)
- mO·/MEDIA/CEC/<port>:sendClick

Parameters

The <port> parameter means the video input or output port. The following are accepted as <commands>:

ok	number_0	display_info	skip_backward
back	number_1	power_legacy	3d_mode
up	number_2	page_up	stop_record
down	number_3	page_down	pause_record
left	number_4	volume_up	play_forward
right	number_5	volume_down	play_reverse
root_menu	number_6	mute_toggle	select_next_
setup_menu	number_7	mute	media
contents_menu	number_8	unmute	select_media_1
f1	number_9	play	select_media_2
f2	dot	stop	select_media_3
f3	enter	pause	select_media_4
f4	clear	record	select_media_5
favorite_menu	channel_up	rewind	power_toggle
media_top_menu	channel_down	fast_forward	power_on
media_context_	sound_select	eject	power_off
menu	input_select	skip_forward	stop_function

Example

- CALL /MEDIA/CEC/I2:sendClick(play)
- mO /MEDIA/CEC/I2:sendClick

7.19.2. Further Commands

Command and Response

- CALL·/MEDIA/CEC/<port>:send(<command>)
- mO·/MEDIA/CEC/<port>:send

Parameters

The <port> parameter means the video input (I1-I4) or video output (O1-O2) port. The following is accepted as <command>:

image_view_on	standby	text_view_on	active_source
get_cec_version	set_osd	clear_osd	give_power_status

The **set_osd** command requires to send also another command, see the following section.

Example

- CALL /MEDIA/CEC/I2:send(standby)
- mO /MEDIA/CEC/I2:send

7.19.3. Sending an OSD String

The OSD string sending consists of two steps. First, set the **OsdString** property with the desired text, then call the **send** method.

Command and Response

- SET·/MEDIA/CEC/<port>.OsdString=<text>
- pw·/MEDIA/CEC/<port>.OsdString=<text>
- CALL·/MEDIA/CEC/<port>:send(set_osd)
- mO·/MEDIA/CEC/I2:send

Parameters

Parameter	Parameter description	Values	Value description
<port>	Video input or video output port	**I1-I4**	Video inputs
		O1-O2	Video outputs
<text>	The desired OSD string		Letters (A-Z) and (a-z), hyphen (-), underscore (_), numbers (0-9), and dot (.). Max length: 14 characters.

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

7.19.4. Sending CEC Commands in Hex Format

- CALL·/MEDIA/CEC/<port>:sendHex(<hex_code>)
- mO·/MEDIA/CEC/<port>:sendHex

Parameters

Parameter	Parameter description	Values	Value description
<port>	Video input or video output port	**I1-I4**	Video inputs
		O1-O2	Video outputs
<hex_code>	The desired CEC command		Max. 30 characters (15 bytes) in hexadecimal format.

Example

- CALL /MEDIA/CEC/I2:sendHex(8700E091)
- mO /MEDIA/CEC/I2:sendHex

7.19.5. Querying the Last Received CEC Message

- GET /MEDIA/CEC/<port>.LastReceivedMessage
- pr /MEDIA/CEC/<port>.LastReceivedMessage=<CEC_message>

Parameters

Parameter	Parameter description	Values	Value description
<port>	Video port	**I1-I4** or **O1-O2**	
<CEC_message>	The last incoming CEC message from the connected device.		

Example

- GET /MEDIA/CEC/I2.LastReceivedMessage
- pr /MEDIA/CEC/I2.LastReceivedMessage=give_power_status

TIPS AND TRICKS: This property can be a condition in the Event manager. When the connected device sends status information via CEC, it could be a trigger for an action.

7.20. Infrared Port Configuration

INFO: Infrared input and output port numbering can be found in the Port Numbering section.

7.20.1. Enabling/Disabling 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

7.20.2. Enabling/Disabling 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).

7.21. Infrared Message Sending

7.21.1. 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 characters 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 in a syntax error.

Example

- CALL /MEDIA/IR/D1:sendProntoHex(00006D0025000300A900A80015003F0015003F0015003F00150
015001500150015001500150015001500150015003F0015003F0015003F0015001500150015001500
15001500150015001500150015003F0015003F0015003F001500150015001500150015001500150015001
50015001500150015001500150015003F0015003F0015003F0015003F0015003F0015000207A900A8
00150015001500E0E)
- 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 LW3 command mentioned above. To 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 with 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 website: http://www.remotecentral.com/features/irdisp2.htm

Step 6. Send the hexa code as described in the previous section.

.

7.22. GPIO Port Configuration

INFO: Use the GET command to query a parameter.

7.22.1. 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

7.22.2. 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

7.22.3. Toggling the Level of a GPIO Pin

The output level can be changed from high to low and from 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

7.23. EDID Management

7.23.1. 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 Factory EDID List section.
<source_port>	The input port where the above EDID is emulated.	**E1-E#**: Input (source) port location, see the EDID Memory Structure section.

Example

- GET /EDID.EdidStatus
- pr /EDID.EdidStatus=D1:E1;D1:E2;D1:E3;D1:E4

7.23.2. 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

7.23.3. 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.

7.23.4. 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 Factory EDID List section.
<destination>	The emulated EDID memory of the desired input port.	**E1-E#**: Input (source) port location, see the EDID Memory Structure section.

Example

- CALL /EDID:switch(F46:E2;F46:E3)
- mO /EDID:switch

7.23.5. 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

7.23.6. 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 EDID Memory Structure section.

Example

- CALL /EDID:copy(D1:U1)
- mO /EDID:copy

7.23.7. 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

7.23.8. Resetting the Emulated EDIDs

Calling this method switches all emulated EDIDs to the factory default one. See the table in the Factory Default Settings section.

Command and Response

- CALL·/EDID:reset()
- mO·/EDID:reset

Example

- CALL /EDID:reset()
- mO /EDID:reset

7.24. 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 CPU Firmware Version
- GET·/SYS/MB.FirmwareVersion

Querying the Package Version
- GET·/MANAGEMENT/UID.PackageVersion

Resetting the Device
- CALL·/SYS:reset(1)

Restoring the Factory Default Settings
- CALL·/SYS:factoryDefaults()

Control Lock
- SET·/MANAGEMENT/UI.ControlLock=<lock_status>

Identifying the Device
- CALL·/MANAGEMENT/UI:identifyMe()

Toggling the Dark Mode Setting
- SET·/MANAGEMENT/UI/DARKMODE.DarkModeEnable=<mode_state>

Setting the Delay of the Dark Mode Setting
- SET·/MANAGEMENT/UI/DARKMODE.DarkModeDelay=<delay_time>

Running a Macro
- CALL·/CTRL/MACROS:run(<macro_name>)

Cleartext Login Protection

Setting the Login Password
- CALL·/LOGIN:setPassword(<password>)

Logging into the Device
- CALL·/LOGIN:login(<password>)

Logging out of the Device
- CALL·/LOGIN:logout(<password>)

Enabling/Disabling the Cleartext Login Function
- SET·/LOGIN:LoginEnable=<login_state>

Video Port Settings

Querying the Status of the Input Ports
- GET·/MEDIA/VIDEO/XP.SourcePortStatus

Querying the Connected Input Port Number
- GET·/MEDIA/VIDEO/<out>.ConnectedSource

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 Port
- 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 an Output Port
- 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>

Event Manager Basics

How to arrange an Event?

- SET·/EVENTS/E<loc>.Condition=<expression>

Setting a Condition by Linking Another Condition

- SET·/EVENTS/E<loc>.Condition=<event_nr>

Setting a Condition by Linking More Conditions

- SET·/EVENTS/E<loc>.Condition=<event_nr>&<event_nr>&<event_nr>&<event_nr>

Setting an Action by Specifying a Direct Path

- SET·/EVENTS/E<loc>.Action=<expression>

Setting an Action by Linking Another Action

- SET·/EVENTS/E<loc>.Action=<event_nr>

Setting an Action by Linking a Macro

- SET·/EVENTS/E<loc>.Action=<macro_name>

Event Manager Tool Kit

Setting the Delay

- SET·/EVENTS/E<loc>.ConditionTimeout=<time>
- SET·/EVENTS/E<loc>.ConditionEndCheck=<true/false>
- SET·/EVENTS/E<loc>.ConditionTimeoutContinuous=<true/false>

Setting the Name of the Event

- SET·/EVENTS/E<loc>.Name=<string>

Enabling/Disabling an Event

- SET·/EVENTS/E<loc>.Enabled=<true/false>

Triggering a Condition

- CALL·/EVENTS/E<loc>:triggerCondition(1)

Querying the Condition Counter

- GET·/EVENTS/E<loc>.ConditionCount

Querying the Condition Trigger Counter

- GET·/EVENTS/E<loc>.ExternalConditionTriggerCount

Testing an Action

- CALL·/EVENTS/E<loc>:ActionTest(1)

Variable-Management

Value Assignment

- SET·/CTRL/VARS/V<loc>.Value=<value>

Addition and Subtraction (Add Method)

- CALL·/CTRL/VARS/V<loc>:add(<operand>;<min>;<max>)

Addition and Subtraction (Cycle Method)

- CALL·/CTRL/VARS/V<loc>:cycle(<operand>;<min>;<max>)

Value Change with Intervals (Case)

- CALL·/CTRL/VARS/V<loc>:case(<min> <max> <val>;)

Scan and Store

- CALL·/CTRL/VARS/V<loc>:scanf(<path>.<property>;<pattern>)

Reformatting a Value

- CALL·/CTRL/VARS/V<loc>:printf(<prefix>%s<postfix>)

Ethernet Port Configuration

Setting the DHCP State
- SET·/MANAGEMENT/NETWORK.DhcpEnabled=<dhcp_status>

Changing the IP Address (Static)
- SET·/MANAGEMENT/NETWORK.StaticIpAddress=<IP_address>

Changing the Subnet Mask (Static)
- SET·/MANAGEMENT/NETWORK.StaticNetworkMask=<netmask>

Changing the Gateway Address (Static)
- SET·/MANAGEMENT/NETWORK.StaticGatewayAddress=<gw_address>

Applying Network Settings
- CALL·/MANAGEMENT/NETWORK:ApplySettings()

Ethernet Tool Kit

Device Filter Based on MAC Address
- SET·/MANAGEMENT/MACFILTER.MACaddress<loc>=<MAC_address>;<receive>;<send>;<name>

LW2 Control Port Blocking
- SET·/MANAGEMENT/SERVICEFILTER.Lw2Enabled=<port_mode>

HTTP Port Blocking
- SET·/MANAGEMENT/SERVICEFILTER.HttpEnabled=<port_mode>

HTTP Post Receiving Blocking
- SET·/MANAGEMENT/SERVICEFILTER.HttpEnabled=<port_mode>

Powering on a Computer over Ethernet (Wake-on-LAN)
- CALL·/MEDIA/ETHERNET:wakeOnLan(MAC_address)

Setting the Host Name
- SET·/MANAGEMENT/NETWORK.HostName=<unique_name>

Ethernet Message Sending

Sending a TCP Message (ASCII-format)
- CALL·/MEDIA/ETHERNET:tcpMessage(<IP_address>:<port_no>=<message>)

Sending a TCP Text (ASCII-format)
- CALL·/MEDIA/ETHERNET:tcpText(<IP_address>:<port_no>=<text>)

Sending a TCP Binary Message (HEX-format)
- CALL·/MEDIA/ETHERNET.tcpBinary(<IP_address>:<port_no>=<HEX_message>)

Sending a UDP Message (ASCII-format)
- CALL·/MEDIA/ETHERNET:udpMessage(<IP_address>:<port_no>=<message>)

Sending a UDP Text (ASCII-format)
- CALL·/MEDIA/ETHERNET:udpText(<IP_address>:<port_no>=<text>)

Sending a UDP Binary Message (HEX-format)
- CALL·/MEDIA/ETHERNET:udpBinary(<IP_address>:<port_no>=<HEX_message>)

HTTP Messaging

Setting the Target IP Address
- SET·/CTRL/HTTP/C1.ServerIP=<IP_address>

Setting the TCP Port
- SET·/CTRL/HTTP/C1.ServerPort=<port_no>

Setting the Target Path
- SET·/CTRL/HTTP/C1.File=<path>

Setting the Message Header
- SET·/CTRL/HTTP/C1.Header=<header_text>

Sending a Post Message
- CALL·/CTRL/HTTP/C1:post(<body_text>)

Sending a Put Message
- CALL·/CTRL/HTTP/C1:put(<body_text>)

TCP Message Recognizer

Setting the IP Address of the TCP Server
- SET·/CTRL/TCP/C<loc>.ServerIP(<IP_address>)

Setting the TCP/IP Port Number of the TCP Server
- SET·/CTRL/TCP/C<loc>.ServerPort(<port_no>)

Connecting to a TCP Server
- CALL·/CTRL/TCP/C<loc>:connect()

Disconnecting from a TCP Server
- CALL·/CTRL/TCP/C<loc>:disconnect()

Setting the Delimiter Hex
- SET·/CTRL/TCP/C<loc>.DelimiterHex=<delimiter>

Setting the Timeout
- SET·/CTRL/TCP/C<loc>.TimeOut=<timeout>

Querying the Last Recognized Message (String)

- GET·/CTRL/TCP/C<loc>.Rx

Querying the Last Recognized Message (Hex)

- GET·/CTRL/TCP/C<loc>.RxHex

Clearing the Last Recognized Stored Message

- CALL·/CTRL/TCP/C<loc>:clear()

Querying the Last Recognized Active Message (String)

- GET·/CTRL/TCP/C<loc>.ActiveRx

Querying the Last Recognized Active Message (Hex)

- GET·/CTRL/TCP/C<loc>.ActiveRxHex

Setting the Active Timeout

- SET·/CTRL/TCP/C<loc>.ActivePropertyTimeout=<a_timeout>

Running an Immediate Event Action

- SET·/CTRL/TCP/C<loc>.ActionTrigger=<event_nr>

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>

RS-232 Message Sending

Sending a Message (ASCII-format) via RS-232

- CALL·/MEDIA/UART/P1:sendMessage(<message>)

Sending a Text (ASCII-format) via RS-232

- CALL·/MEDIA/UART/P1:sendText(<message>)

Sending a Binary Message (HEX-format) via RS-232

- CALL·/MEDIA/UART/P1:sendBinaryMessage(<message>)

Using Hexadecimal Codes

RS-232 Message Recognizer

Enabling/Disabling the Recognizer

- SET·/MEDIA/UART/<serial_port>.RecognizerEnable=<recognizer_enable>

Setting the Delimiter Hex

- SET·/MEDIA/UART/RECOGNIZER.DelimiterHex=<delimiter>

Setting the Timeout

- SET·/MEDIA/UART/RECOGNIZER.TimeOut=<timeout>

Querying the Last Recognized Message (String)

- GET·/MEDIA/UART/RECOGNIZER.Rx

Querying the Last Recognized Message(Hex)

- GET·/MEDIA/UART/RECOGNIZER.RxHex

Clearing the Last Recognized Stored Message

- CALL·/MEDIA/UART/RECOGNIZER:clear()

Querying the Last Recognized Active Message (String)

- GET·/MEDIA/UART/RECOGNIZER.ActiveRx

Querying the Last Recognized Active Message (Hex)

- GET·/MEDIA/UART/RECOGNIZER.ActiveRxHex

Setting the Active Timeout

- SET·/MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=<a_timeout>

Running an Immediate Event Action

- SET·/CTRL/TCP/C<loc>.ActionTrigger=<event_nr>

CEC Command Sending

Press&Release Commands

- CALL·/MEDIA/CEC/<port>:sendClick(<command>)

Further Commands

- CALL·/MEDIA/CEC/<port>:send(<command>)

Sending an OSD String

- SET·/MEDIA/CEC/<port>.OsdString=<text>
- CALL·/MEDIA/CEC/<port>:send(set_osd)

Sending CEC Commands in Hex Format

- CALL·/MEDIA/CEC/<port>:sendHex(<hex_code>)

Querying the Last Received CEC Message

- GET /MEDIA/CEC/<port>.LastReceivedMessage

Infrared Port Configuration

Enabling/Disabling Command Injection Mode

- SET·/MEDIA/IR/<port>.CommandInjectionEnable=<CI_set>

Enabling/Disabling Output Signal Modulation

- SET·/MEDIA/IR/<out>.EnableModulation=<mod_set>

Infrared Message Sending

Sending Pronto Hex Codes in Little-endian Format via IR Port

- CALL·/MEDIA/IR/D1:sendProntoHex(<hex_code>)

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 Update

The devices can be updated 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 updated, the normal operation mode is suspended, as the device is switched to bootload mode. The firmware update process has an effect on the configuration and the settings of the device.

8.1. Introduction

Lightware Device Updater v2 (LDU2) software is the second generation of the LFP-based (Lightware Firmware Package) firmware update process.

DIFFERENCE: This 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 update.


LDU


LDU2

8.2. Preparation

Most Lightware devices can be controlled over several interfaces (e.g. Ethernet, USB, RS-232). But the firmware can be updated usually over one dedicated interface, which is the Ethernet in most cases.

If you want to update 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 update 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 applications have the same look and functionality.

Download the software from www.lightware.com/downloads.

Installation Modes

Normal install	Snapshot install
Available for Windows, macOS and Linux	Available for Windows only
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 Windows OS

Run the installer. If the User Account Control displays a pop-up message, click **Yes**.

Using the **Normal install** (default setting) is highly recommended.

Installation in case of macOS

Mount the DMG file by 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 to the **Normal install** of Windows.

ATTENTION! Please check the firewall settings on the macOS device. LDU2 needs to be added to the exeptions of the blocked softwares for proper operation.

Installation in case of Linux

Step 1. Download the **archive file** (tar.gz) from www.lightware.com and unpack it to a temp folder.

Step 2. Run the **install_ldu2.sh** file in the temp folder. The script will install LDU2 into the following folder: HOME/.local/share/lightware/ldu2.

Step 3. Above folder will contain this file: **LightwareDeviceUpdaterV2.sh** that can be used to start LDU2.

8.3. Running the Software

DIFFERENCE: Added support for firmware update from a host PC that is in another subnet as the device. The feature is available only **from firmware package v1.3.6b2**.

You have two options:

- **Starting the LDU2** by double-clicking on the shortcut/program file, or
- Double-clicking on an **LFP2 file**.

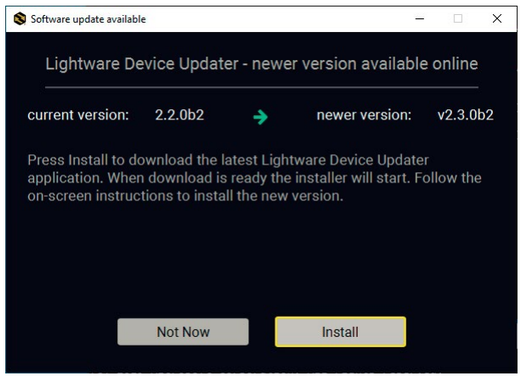
8.3.1. LDU2 Interfaces

The software can be used over:

- The Graphical User Interface (GUI), or by
- The Command Line Interface (CLI).

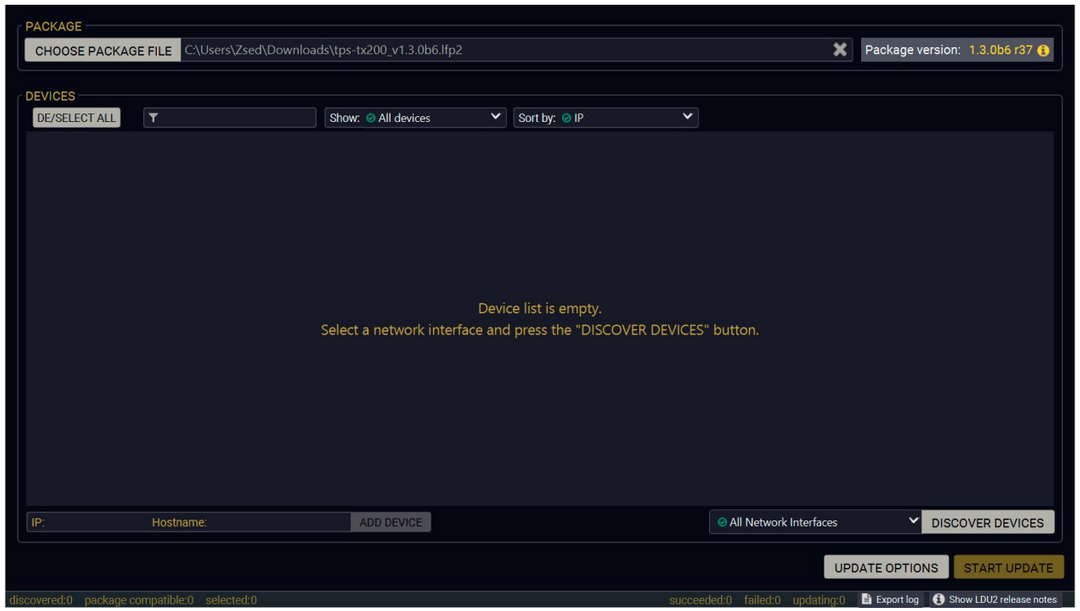
LDU2 Auto-Update

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:



Devices may also be added manually by typing the IP address in the box near the bottomof the screen. From LDU2 version v2.16.1, manual addition of devices can also be done using the hostname.

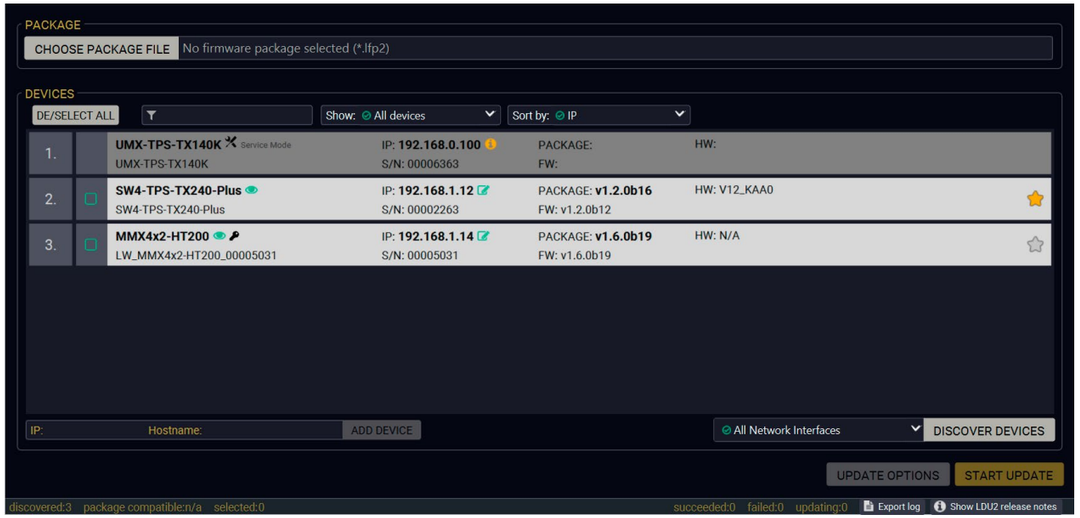
ATTENTION! If the device cannot be added by the hostname, please use the IP address.

If you start the software by double-clicking on the LFP2 file, the firmware will be loaded. Press the **Discover devices** button; all the devices will be listed which are compatible with the selected firmware pack.

INFO: If you press the **Choose package file** 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.



If the desired device is not discovered, you can add it by typing the IP address in the dedicated field and press the **Add device** button.

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 in the front panel LEDs blinking for 10 seconds, which helps identify the device physically.
	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 be highlighted in that line.
	Further information available	Device is unreachable. Change the IP address by pressing the **IP address editor** icon or use the front panel buttons (if available).
	Cleartext login enabled	The password-protection is enabled. You have to enter the password to perform the firmware update in the **Parameters** window or in the appearing window in the beginning of the update.
	Service mode	The device is in bootload mode. Backup and restore cannot be performed in this case.

8.4. The Updating Steps

> **ATTENTION!** While the firmware is being updated, the normal operation mode is suspended, as the device is switched to bootload mode. Signal processing is not performed. Do not interrupt the firmware update. If any problem occurs, reboot the unit and restart the process.

Keeping the Configuration Settings

By default, device configuration settings are restored when firmware update 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.

Step 1. Create a backup

The current configuration of the device is being saved into a configuration backup file on your computer.

Step 2. Start the Update

The device reboots and starts in bootload mode (firmware update mode).

Step 3. Update

The CPU firmware is changed to the new one.

Step 4. Factory reset

All configuration settings are restored to the factory default values.

Step 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!

Step 6. Finish

Once the firmware update procedure is finished, the device reboots and is ready to use.

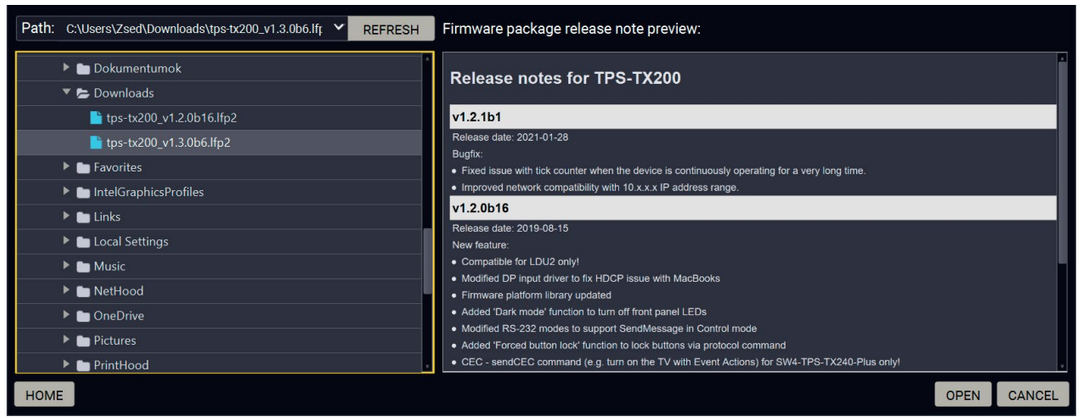
8.5. Updating Via GUI

To update the desired device(s) via the Graphical User Interface, follow these steps.

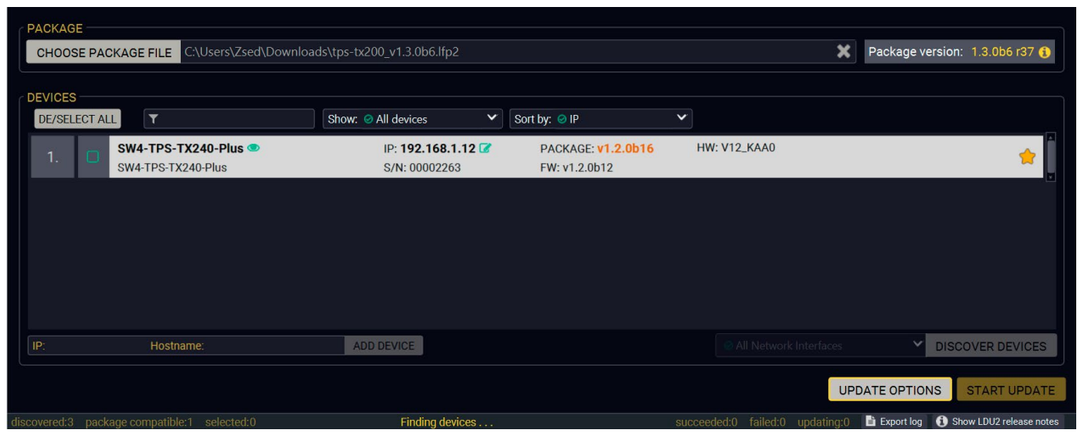
Step 1. Select the Firmware Package.

Click on the **Choose Package File** 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.

CHOOSE PACKAGE FILE



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 update by double-clicking on the LFP file, the screen above will be loaded right away.

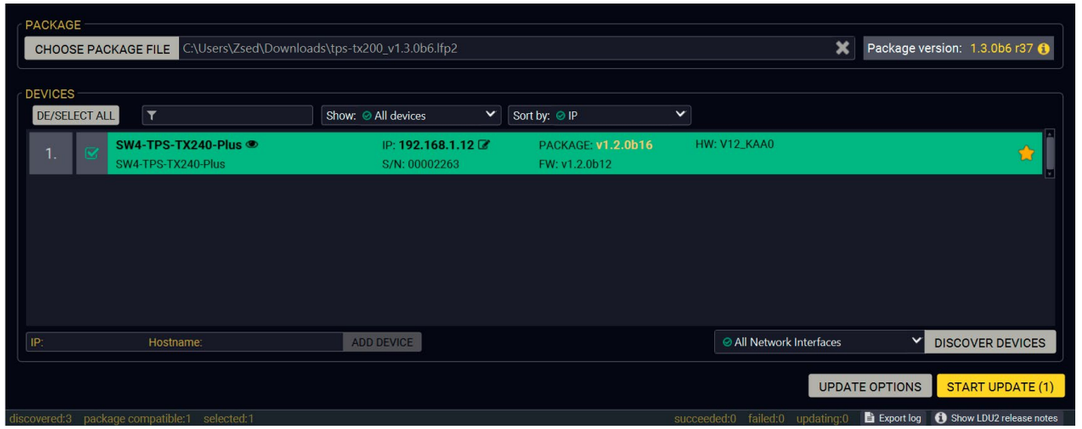
The Meaning of the Symbols

Show details	The log about the updating 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 updating.

Select the devices for updating; 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 find the device physically.



Step 3. Check the update parameters.

DIFFERENCE: The appearing settings are device-dependent and can be different from device to device.

Clicking on the **Update Options** button, special settings will be available, like:

UPDATE OPTIONS

- Creating a backup about the configuration,
- Restoring the configuration or reloading the factory default settings after the firmware update,
- Uploading the default Miniweb (if available)
- Entering the password for the Cleartext login. *#builtinweb* *#miniweb* *#web*

INFO: The password entered here will be used for all selected devices where the Cleartext login is enabled. If the password is incorrect, a window will appear to ask for the correct one at each device during the update.

Please arrange the settings carefully.

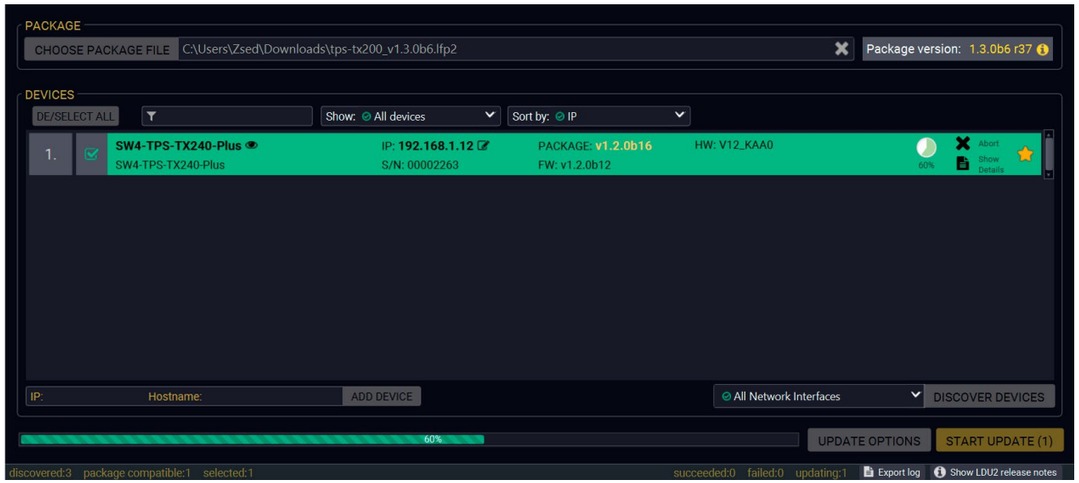
Step 4. Start the update and wait until it is finished.

Click on the **Start Update** button to start the procedure. The status is shown in percent on the right side of the device line and the overall process on the bottom progress bar.

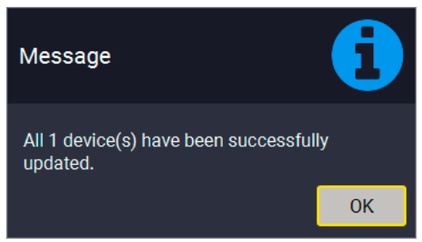
START UPDATE

If the Cleartext login is enabled and you did not enter the password in the **Parameters** window (or it is incorrect) a window will appear to ask for the password at each device.

INFO: The device might reboot during the firmware update procedure.



The log about the updating process can be displayed in a new window by pressing the button. When the progress bar reaches 100% (**Done** is displayed at all devices), the update 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 update procedure is completed, the device is rebooted with the new firmware. Shutting down and restarting the device is recommended.

8.6. Command Line Interface (CLI)

DIFFERENCE: The Command Line Interface is available from LDU2 v2.9.0b9.

The CLI of the LDU2 software is a simple tool for creating scriptable device updates without the need of human interactions. It allows batch updating with the same features which are available in case of GUI usage.

8.6.1. How to Run

Running under Windows® OS

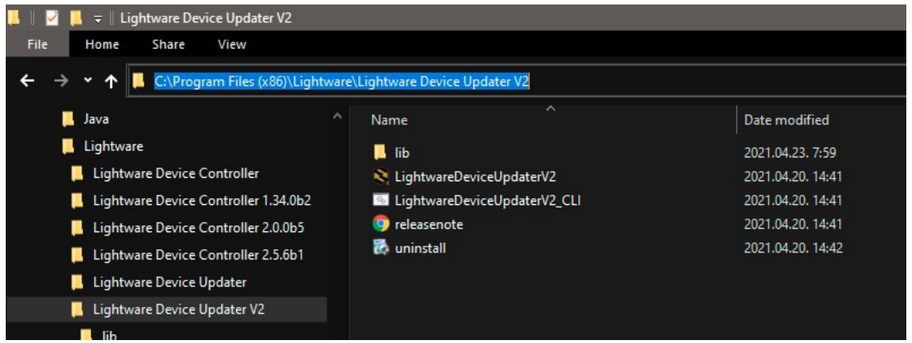
The installer of LDU2 puts the following file into the installation folder:

`LightwareDeviceUpdaterV2_CLI.cmd`

CLI is available by this file, the exe is not suitable for that purpose. Open a command line window to execute or test the features directly.

Step 1. Open an Explorer window where the cmd file is located, the default is: `c:\Program Files (x86)\Lightware\Lightware Device Updater V2\LightwareDeviceUpdaterV2_CLI.cmd`.

Step 2. Click on the address line (highlighed with blue in the picture), type **`cmd.exe`** and press enter. The command interpreter window of Windows is opened at the path of the LDU2 install folder.



Step 3. Now you can use the `LightwareDeviceUpdaterV2_CLI.cmd` file with the commands and options which are described in the coming sections:

Running under Linux

The Command Line Interface under Linux Operating Systems can be run by the following:

`LightwareDeviceUpdaterV2.sh.`

Running an update:

```
bash LightwareDeviceUpdaterV2.sh update --ip 172.24.5.27 --package ~/Downloads/tps-tx200_1.3.1b3.lfp2
```

The commands and options are the same under Windows® and Linux, too. The following sections contain examples with **LightwareDeviceUpdaterV2_CLI.cmd**.

8.6.2. How to Use

Command Structure

The commands can be run over CLI in the following way:

`LightwareDeviceUpdaterV2_CLI.cmd [command] [options]`

`[Command]`: a certain command described in the coming sections; only one command can be run at a time

`[Options]`: mandatory and/or optional parameters of the command, if any. Optional parameters have a default value, which can be found at each affected command. You only have to define the parameter if you want to apply a different value. The **order of the options** is arbitrary.

Important Notes

- CLI is **case-sensitive** (including commands, options and other parameters).
- There is **no limit** regarding the number of the devices to update. At most 20 devices are updated simoultaneously, when one of them is finished, the following (21st) will be started automatically.
- If an update is failed, the IP address of the affected device(s) are listed at the end.

8.7. CLI Commands

> INFO: The commands and options described in the following sections are the same under Windows® and Linux, too. The examples contain **LightwareDeviceUpdaterV2_CLI.cmd**.

About the Examples

- Sent command is in **blue**, response is in **grey**.
- If the response in practice is **longer than listed** in the example, this symbol can be seen: `[...]`.

8.7.1. Help

The defined commands and options can be listed by the **help** command.

Command

`LightwareDeviceUpdaterV2_CLI.cmd help`

Example

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd help

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar help
Command line usage:
    Win: LightwareDeviceUpdaterV2_CLI.cmd [command] [options]
    Linux: LightwareDeviceUpdaterV2.sh [command] [options]

    Commands:
        * help
        * version
        * update
        * deviceInfo
        * restore
        * packageOptions
[...]
```

8.7.2. LDU2 Version

The response shows the version of the LDU2 and the version of the Script API (the Application Programming Interface that is used by the LDU2 and the script).

Command

`LightwareDeviceUpdaterV2_CLI.cmd version`

Example

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd version

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar version
LDU2 version: 2.9.0b9
Script API version: 1.3.9
```

8.7.3. Check For New LDU2 Version

The following command can be used to check if an update of LDU2 is available. This is just a request, since the CLI is not suitable for handling the complete installer of the software.

Command

`LightwareDeviceUpdaterV2_CLI.cmd checkForUpdates`

Example 1

```
c:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd checkForUpdates

c:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar checkForUpdates
Current LDU2 version: 2.9.1b1
LDU2 is up-to-date
```

Example 2

```
c:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd checkForUpdates

c:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar checkForUpdates
Current LDU2 version: 2.9.1b1
New version is available online: v2.9.2b2
Download URL: http://update.lightware.hu/ldu2/lwr/v2.9.2b2/install_LDU2_v2.9.2b2.exe
```

8.7.4. Device Info

The most important information about the selected device is displayed; see the example for more details.

Command

```
LightwareDeviceUpdaterV2_CLI.cmd deviceInfo [options]
```

Options

Option	Description	Required?
-i or --ip	List of IP addresses of devices to be updated	one of them is mandatory
-n or --hostName	List of host names of devices to be updated	
-v or --packageVersion	Shows installed package version only	optional

Example 1

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd deviceInfo --ip
192.168.1.12

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar deviceInfo --ip
192.168.1.12
Product name:    SW4-TPS-TX240-Plus
IP address:      192.168.1.12
Serial number:   00002263
MAC address:     a8:d2:36:ff:22:63
Part number:     91540065
Device label:    123
Package version: v1.3.0b6
CPU FW version:  v1.3.0b3
HW version:      V12_KAA0
Operation mode:  Application mode
```

Example 2

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd deviceInfo --ip
192.168.1.12 --packageVersion

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar deviceInfo --ip
192.168.1.12 --packageVersion
v1.3.0b6
```

8.7.5. Update

This command can be used to update the firmware of the devices.

Command

```
LightwareDeviceUpdaterV2_CLI.cmd update [options]
```

Options

Option	Description	Required?
-p or --package	The path of the firmware package file	yes
-i or --ip	List of IP addresses of devices to be updated	one of them is mandatory
-n or --hostName	List of host names of devices to be updated	
-b or --backupFolder	Folder to create device configuration backup at. Default: USER_HOME/.ldu2/backup	optional
-f or --factoryDefault	Apply factory reset during device update. Default: false	optional
-r or --reportProgress	Report update progress in percentage form. Default: false	optional
Package-specific options	Certain LFP2 packages have features which can be applied at this command; see the Package Options section.	optional

ATTENTION! The configuration is restored automatically if the factory default option is not applied in the **update** command.In that case, there is no need to run the **restore** command after the update.

Example

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd update --ip
192.168.1.12 --package C:\Firmwares\tps-tx200_v1.3.2b3.lfp2 --reportProgress

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar update --ip
192.168.1.12 --package C:\Firmwares\tps-tx200_v1.3.2b3.lfp2 --reportProgress
[2021-05-12 08:59:36.336] [ INFO] [           main] - Device IPs: [192.168.1.12]
[2021-05-12 08:59:39.409] [ INFO] [           main] - All the selected devices are accessible over the network.
[2021-05-12 08:59:39.628] [ INFO] [           main] - All the selected devices are compatible with the specified
package.
[2021-05-12 08:59:40.025] [ INFO] [    192.168.1.12] - Package version: 1.3.2b3
[2021-05-12 08:59:40.092] [ INFO] [    192.168.1.12] - Login functionality is currently not enabled.
[2021-05-12 08:59:40.129] [ INFO] [    192.168.1.12] - Creating backup of device settings...
[2021-05-12 08:59:43.582] [ INFO] [    192.168.1.12] - Backup HTTP enable properties
[2021-05-12 08:59:44.638] [ INFO] [ProgressReporter] - Progress: 2%
[2021-05-12 08:59:46.111] [ INFO] [    192.168.1.12] - HTTP and HTTP post have got enabled on port 80
[2021-05-12 08:59:46.319] [ INFO] [    192.168.1.12] - No miniweb file is found on the device.
[2021-05-12 08:59:48.890] [ INFO] [    192.168.1.12] - HTTP and HTTP post properties have got restored on port 80
[2021-05-12 08:59:48.897] [ INFO] [    192.168.1.12] - Switching device into bootload mode...
[2021-05-12 08:59:49.640] [ INFO] [ProgressReporter] - Progress: 5%
[...]
```

The lines containing "ProgressReporter" can be enabled optionally. If it is enabled, the current state is displayed every 5 seconds.

8.7.6. Restore

Restores device configuration from a backup file.

> TIPS AND TRICKS: This command can be used for uploading a configuration to numerous devices (aka Configuration cloning by CLI).

Command

```
LightwareDeviceUpdaterV2_CLI.cmd restore [options]
```

Options

Option	Description	Required?
-i or --ip	List of IP addresses of devices to be updated	one of them is mandatory
-n or --hostName	List of host names of devices to be updated	
-b or --backupFile	The path of the configuration backup file	yes
-k or --keepOriginalIp	Do not override the network settings of the device with the ones in the backup file. It comes in handy when multiple devices' configuration is being restored from a single backup file. Default: false	optional

> **ATTENTION!** The configuration is restored automatically if the factory default option is not applied in the **update** command.In that case, there is no need to run the **restore** command after the update.

Example

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd restore --ip
192.168.1.12 --backupFile C:\mybackup.lw3 --keepOriginalIp

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar restore --ip
192.168.1.12 --backupFile C:\mybackup.lw3 --keepOriginalIp
[2021-05-12 10:49:36.412] [ INFO] [           main] - Executing configuration restore...
[2021-05-12 10:49:36.425] [ INFO] [           main] - Device IPs: [192.168.1.12]
```

> INFO: The firmware package checks the backup data before the restoration procedure and if it is necessary, a conversion is applied to avoid incompatibility problems between the firmware versions. In that case, two backup files are created: the original, and a new one with "_converted" suffix. Using the last one for restoring is recommended.

8.7.7. Package Options

Shows package-specific update options.

Command

```
LightwareDeviceUpdaterV2_CLI.cmd packageOptions [options]
```

Options

Option	Description	Required?
-p or --package	The path of the firmware package file	yes

Example

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd packageOptions
--package c:\Firmwares\tps-tx200_v1.3.2b3.lfp2

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar packageOptions
--package c:\Firmwares\tps-tx200_v1.3.2b3.lfp2

Backup and restore options:
       --skipPresetsAtRestore : if true, device presets will not be restored. (Default: false)
       --uploadDefaultMiniWeb : if true and no custom miniweb is present on the device, the default built-in
miniweb will be uploaded to the device. (Default: false)

Login options:
       --clearTextLoginPw : The cleartext login password used when updating devices. (Default: empty string)

Test options:
       --test : if true, no update will be performed, communication with the device will be tested. (Default:
false)
```

Package option example can be seen in the following section.

8.7.8. Complex Examples

Example 1

The following options are applied:

- Firmware is updated
- Factory default settings are restored

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd update --ip
192.168.1.12 --factoryDefault --package c:\Firmwares\tps-tx200_v1.3.2b3.lfp2

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar update --ip
192.168.1.12 --factoryDefault --package c:\Firmwares\tps-tx200_v1.3.2b3.lfp2
[2021-05-12 11:22:09.089] [ INFO] [           main] - Device IPs: [192.168.1.12]
[2021-05-12 11:22:12.947] [ INFO] [           main] - All the selected devices are accessible over the network.
[2021-05-12 11:22:13.225] [ INFO] [           main] - All the selected devices are compatible with the specified
package.
[2021-05-12 11:22:13.777] [ INFO] [    192.168.1.12] - Package version: 1.3.2b3
[2021-05-12 11:22:13.878] [ INFO] [    192.168.1.12] - Login functionality is currently not enabled.
[2021-05-12 11:22:13.896] [ INFO] [    192.168.1.12] - Switching device into bootload mode...
[2021-05-12 11:22:34.519] [ INFO] [    192.168.1.12] - Gathering UID information from device...
[2021-05-12 11:22:35.097] [ INFO] [    192.168.1.12] - UID info - Device IP: 192.168.1.12 Product name: SW4-
TPS-TX240-Plus Product part number: 91540065 Serial number: 00002263 Hardware version: V12_KAA0 MAC address:
A8:D2:36:FF:22:63
[2021-05-12 11:22:35.589] [ INFO] [    192.168.1.12] - Package version on device: 1.3.2b3 r44
[2021-05-12 11:22:35.626] [ INFO] [    192.168.1.12] - Updating HDMI-TPS-TX200 series application fw part 1...
[2021-05-12 11:22:36.123] [ INFO] [    192.168.1.12] -  [tps_tx200.bin.ER_IROM1]'s current version on device:
1.3.1b1 r35
[2021-05-12 11:22:36.124] [ INFO] [    192.168.1.12] -  [tps_tx200.bin.ER_IROM1]'s version in the package: 1.3.1b1
r35
[2021-05-12 11:22:52.439] [ INFO] [    192.168.1.12] -  [tps_tx200.bin.ER_IROM1]'s firmware version updated in FVS
EEPROM.
[2021-05-12 11:22:52.442] [ INFO] [    192.168.1.12] - Updating VS100TX fw...
[2021-05-12 11:22:52.920] [ INFO] [    192.168.1.12] -  [vs100_tx.bin]'s current version on device: 1.1.0b0 r0
[2021-05-12 11:22:52.921] [ INFO] [    192.168.1.12] -  [vs100_tx.bin]'s version in the package: 1.1.0b0 r63
[2021-05-12 11:23:06.423] [ INFO] [    192.168.1.12] -  [vs100_tx.bin]'s firmware version updated in FVS EEPROM.
[2021-05-12 11:23:06.425] [ INFO] [    192.168.1.12] - Updating HDMI-TPS-TX200 series application fw part 2...
[2021-05-12 11:23:06.903] [ INFO] [    192.168.1.12] -  [tps_tx200.bin.ER_IROM2]'s current version on device:
1.3.1b1 r35
[2021-05-12 11:23:06.904] [ INFO] [    192.168.1.12] -  [tps_tx200.bin.ER_IROM2]'s version in the package: 1.3.1b1
r35
[2021-05-12 11:23:27.858] [ INFO] [    192.168.1.12] -  [tps_tx200.bin.ER_IROM2]'s firmware version updated in FVS
EEPROM.
[2021-05-12 11:23:27.860] [ INFO] [    192.168.1.12] - Updating PS171 FW...
[2021-05-12 11:23:28.338] [ INFO] [    192.168.1.12] -  [tps_family_ps171.bin]'s current version on device: 1.0.6b0
r0
[2021-05-12 11:23:28.340] [ INFO] [    192.168.1.12] -  [tps_family_ps171.bin]'s version in the package: 1.0.6b0
r522
[2021-05-12 11:23:44.810] [ INFO] [    192.168.1.12] -  [tps_family_ps171.bin]'s firmware version updated in FVS
EEPROM.
[2021-05-12 11:23:51.412] [ INFO] [    192.168.1.12] - Setting system information...
[2021-05-12 11:23:57.994] [ INFO] [    192.168.1.12] - Starting application...
[2021-05-12 11:25:44.239] [ INFO] [    192.168.1.12] - Done

All 1 update(s) finished successfully.
```

Example 2

The following options are applied:

- Cleartext login password is applied
- Custom backup folder is set
- Current configuration is saved
- Firmware is updated
- Saved configuration is restored

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd update --ip
192.168.1.12 --package c:\Firmwares\tps-tx200_v1.3.2b3.lfp2 --backupFolder c:\My_backup --clearTextLoginPw qwer1234

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar update --ip
192.168.1.12 --package c:\Firmwares\tps-tx200_v1.3.2b3.lfp2 --backupFolder c:\My_backup --clearTextLoginPw qwer1234
[2021-05-12 11:54:52.531] [ INFO] [           main] - Device IPs: [192.168.1.12]
[2021-05-12 11:54:55.148] [ WARN] [ pool-2-thread-1] - NetworkMask property is not available. Cannot determine
whether the device is on the same network or not.
[2021-05-12 11:54:55.209] [ WARN] [ pool-2-thread-1] - Bonjour device builder error messages: [object Array]
[2021-05-12 11:54:55.263] [ INFO] [           main] - All the selected devices are accessible over the network.
[2021-05-12 11:54:55.499] [ INFO] [           main] - All the selected devices are compatible with the specified
package.
[2021-05-12 11:54:55.972] [ INFO] [    192.168.1.12] - Package version: 1.3.2b3
[2021-05-12 11:54:56.136] [ INFO] [    192.168.1.12] - Logged in successfully.
[2021-05-12 11:54:56.160] [ INFO] [    192.168.1.12] - Creating backup of device settings...
[2021-05-12 11:54:59.551] [ INFO] [    192.168.1.12] - Backup HTTP enable properties
[2021-05-12 11:55:02.111] [ INFO] [    192.168.1.12] - HTTP and HTTP post have got enabled on port 80
[2021-05-12 11:55:02.305] [ INFO] [    192.168.1.12] - No miniweb file is found on the device.
[2021-05-12 11:55:04.854] [ INFO] [    192.168.1.12] - HTTP and HTTP post properties have got restored on port 80
[2021-05-12 11:55:04.860] [ INFO] [    192.168.1.12] - Switching device into bootload mode...
[2021-05-12 11:55:26.504] [ INFO] [    192.168.1.12] - Gathering UID information from device...
[2021-05-12 11:55:27.015] [ INFO] [    192.168.1.12] - UID info - Device IP: 192.168.1.12 Product name: SW4-
TPS-TX240-Plus Product part number: 91540065 Serial number: 00002263 Hardware version: V12_KAA0 MAC address:
A8:D2:36:FF:22:63
[2021-05-12 11:55:27.497] [ INFO] [    192.168.1.12] - Package version on device: 1.3.2b3 r44
[2021-05-12 11:55:28.005] [ INFO] [    192.168.1.12] - Updating HDMI-TPS-TX200 series application fw part 1...
[2021-05-12 11:55:28.500] [ INFO] [    192.168.1.12] -  [tps_tx200.bin.ER_IROM1]'s current version on device:
1.3.1b1 r35
[2021-05-12 11:55:28.501] [ INFO] [    192.168.1.12] -  [tps_tx200.bin.ER_IROM1]'s version in the package: 1.3.1b1
r35
[2021-05-12 11:55:44.386] [ INFO] [    192.168.1.12] -  [tps_tx200.bin.ER_IROM1]'s firmware version updated in FVS
EEPROM.
[2021-05-12 11:55:44.386] [ INFO] [    192.168.1.12] - Updating VS100TX fw...
[2021-05-12 11:55:44.859] [ INFO] [    192.168.1.12] -  [vs100_tx.bin]'s current version on device: 1.1.0b0 r0
[2021-05-12 11:55:44.859] [ INFO] [    192.168.1.12] -  [vs100_tx.bin]'s version in the package: 1.1.0b0 r63
[2021-05-12 11:55:58.122] [ INFO] [    192.168.1.12] -  [vs100_tx.bin]'s firmware version updated in FVS EEPROM.
[2021-05-12 11:55:58.123] [ INFO] [    192.168.1.12] - Updating HDMI-TPS-TX200 series application fw part 2...
[2021-05-12 11:55:58.597] [ INFO] [    192.168.1.12] -  [tps_tx200.bin.ER_IROM2]'s current version on device:
1.3.1b1 r35
[2021-05-12 11:55:58.598] [ INFO] [    192.168.1.12] -  [tps_tx200.bin.ER_IROM2]'s version in the package: 1.3.1b1
r35
[2021-05-12 11:56:18.817] [ INFO] [    192.168.1.12] -  [tps_tx200.bin.ER_IROM2]'s firmware version updated in FVS
EEPROM.
[2021-05-12 11:56:18.818] [ INFO] [    192.168.1.12] - Updating PS171 FW...
[2021-05-12 11:56:19.293] [ INFO] [    192.168.1.12] -  [tps_family_ps171.bin]'s current version on device: 1.0.6b0
r0
[2021-05-12 11:56:19.294] [ INFO] [    192.168.1.12] -  [tps_family_ps171.bin]'s version in the package: 1.0.6b0
```

```
r522
[2021-05-12 11:56:35.668] [ INFO] [    192.168.1.12] -  [tps_family_ps171.bin]'s firmware version updated in FVS
EEPROM.
[2021-05-12 11:56:42.224] [ INFO] [    192.168.1.12] - Setting system information...
[2021-05-12 11:56:48.780] [ INFO] [    192.168.1.12] - Starting application...
[2021-05-12 11:58:39.139] [ INFO] [    192.168.1.12] - Waiting for VS100...
[2021-05-12 11:58:40.843] [ INFO] [    192.168.1.12] - Restoring device settings from the following backup file:
c:\My_backup\backup_91540065_00002263_2021-05-12_11-54-56_converted.lw3 ...
[2021-05-12 11:58:47.038] [ INFO] [    192.168.1.12] - Device settings have been restored
[2021-05-12 11:58:47.066] [ INFO] [    192.168.1.12] - Resetting device...
[2021-05-12 11:58:52.082] [ INFO] [    192.168.1.12] - Done

All 1 update(s) finished successfully.
```

Example 3

The following options are applied:

- Cleartext login password is applied
- Custom backup folder is set
- Current configuration is saved
- Firmware is **not updated,** but the process and the connection is **tested**

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd update --test --ip
192.168.1.12 --package c:\Firmwares\tps-tx200_v1.3.2b3.lfp2 --backupFolder c:\My_backup --clearTextLoginPw qwer1234

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar update --test
--ip 192.168.1.12 --package c:\Firmwares\tps-tx200_v1.3.2b3.lfp2 --backupFolder c:\My_backup --clearTextLoginPw
qwer1234
[2021-05-12 12:02:23.179] [ INFO] [           main] - Device IPs: [192.168.1.12]
[2021-05-12 12:02:25.615] [ WARN] [ pool-2-thread-1] - NetworkMask property is not available. Cannot determine
whether the device is on the same network or not.
[2021-05-12 12:02:25.723] [ WARN] [ pool-2-thread-1] - Bonjour device builder error messages: [object Array]
[2021-05-12 12:02:25.771] [ INFO] [           main] - All the selected devices are accessible over the network.
[2021-05-12 12:02:25.968] [ INFO] [           main] - All the selected devices are compatible with the specified
package.
[2021-05-12 12:02:26.396] [ INFO] [    192.168.1.12] - PASSED - Test #01 - Communication over LW3
[2021-05-12 12:02:26.457] [ INFO] [    192.168.1.12] - PASSED - Test #02 - Cleartext login - PW is correct
[2021-05-12 12:02:26.501] [ INFO] [    192.168.1.12] - Creating backup of device settings...
[2021-05-12 12:02:29.952] [ INFO] [    192.168.1.12] - Backup HTTP enable properties
[2021-05-12 12:02:32.507] [ INFO] [    192.168.1.12] - HTTP and HTTP post have got enabled on port 80
[2021-05-12 12:02:32.732] [ INFO] [    192.168.1.12] - No miniweb file is found on the device.
[2021-05-12 12:02:35.266] [ INFO] [    192.168.1.12] - HTTP and HTTP post properties have got restored on port 80
[2021-05-12 12:02:35.268] [ INFO] [    192.168.1.12] - PASSED - Test #03 - Configuration and/or device preset
backup created
[2021-05-12 12:02:35.289] [ INFO] [    192.168.1.12] - Switching device into bootload mode...
[2021-05-12 12:02:36.996] [ INFO] [    192.168.1.12] - PASSED - Test #04 - Switch device into bootloader mode
[2021-05-12 12:02:54.316] [ INFO] [    192.168.1.12] - PASSED - Test #05 - Communication with bootloader
[2021-05-12 12:02:54.330] [ INFO] [    192.168.1.12] - Gathering UID information from device...
[2021-05-12 12:02:54.832] [ INFO] [    192.168.1.12] - PASSED - Test #06 - TFTP file transfer
[2021-05-12 12:03:12.030] [ INFO] [    192.168.1.12] - PASSED - Test #07 - Start application FW
[2021-05-12 12:03:12.876] [ INFO] [    192.168.1.12] - Done

All 1 update(s) finished successfully.
```

8.7.9. Exit Codes

There is a return value in all cases when a command run is finished. Currently, three codes are defined:

Code	Displayed text	Description
0	N/A	The update performed successfully
1	Update error (ErrorCode:1)	The error happened during the update
2	CLI error (ErrorCode:2	The error happened before starting the update

The error line contains further information about the error.

Querying the Exit Code under Windows®

```
c:\Program Files (x86)\Lightware\Lightware Device Updater V2\echo %errorlevel%
0
```

Querying the Exit Code under Linux

```
echo $?
0
```

If this value is queried after the update and it is 0, the update performed successfully.

8.8. If the Update is not successful

- Restart the process and try the update again.
- If the device cannot be switched to bootload (firmware update) 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 update. A root cause can be that the desired device is already in bootload (firmware update) mode, thus the normal operation mode is suspended and backup cannot be made.
- If an update is not successful, 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.

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.

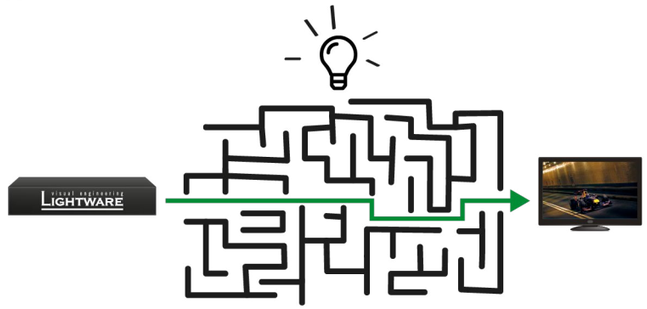
Legend

- Link to connections/cabling section.
- Link to front panel operation section.
- Link to LDC software section.
- Link to LW2 protocol commands section.
- 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.	5.6.4 7.6.26
	The input port is muted	Check the mute state of input port.	5.6.1 7.6.1
	The output port is muted	Check the mute state of output port.	5.6.4 6.4.6 7.6.3
	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).	5.9 7.23
	HDCP is disabled	Enable HDCP on the input and output ports.	5.6.1 5.6.4 7.6.18 7.6.20
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.	5.6.4 7.6.23
	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.	5.6.2 5.6.3 7.7.1
	Audio output port is muted	Check the output port properties.	5.6.4 6.4.6 7.7.2
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.	5.6.4 7.6.24
	DVI EDID is emulated	Check the EDID and select an HDMI EDID to emulate.	5.9 7.23
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).	5.10.1 7.12
	RS-232 mode is not right	Check the RS-232 mode settings (control, command injection, or disconnected).	5.10.1 7.16.6

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 5.12.2 7.11.1
		Restore the factory default settings (with fix IP).	2.5.5 5.12.5 6.3.13 7.4.7
	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.	5.10.2 6.5.1 7.22
		Miscellaneous	
Front panel buttons are out of operation	Buttons are locked	Unlock the buttons	2.5.7 5.12.1
Error messages received continuously	Different protocol is set	Check the port protocol settings (LW2 / LW3) and use the proper protocol commands.	5.10.1 7.16.1
	Firmware package difference	The firmware of the device and the command description in the User's manual are based on different firmware package versions. Check the versions and update if necessary.	page 3 5.12.1

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 find 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 it 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 an Event Manager issue, the event file and/or backup file from the Device Controller software.
- The more of the information above you can give us, the better. Please send this information to the Lightware Support Team (support@lightware.com) to speed up the troubleshooting process.

10

Technologies

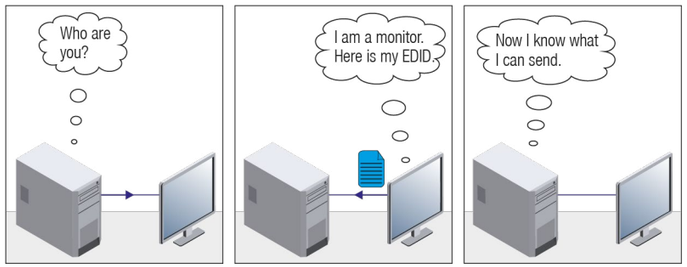
The following sections contain descriptions and useful technical information how the devices work in the background. The content is based on experiences and cases we met in the practice. These sections help understand features and technical standards.

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 a 128-byte-long EDID structure. However, Digital Televisions and HDMI capable displays may have another 128 bytes, which is called E-EDID and is 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 the 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 that 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).

The 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. The EDID can be changed even if a source is connected to the input and powered ON.

INFO: When the 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 both 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. Even though 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 with an HDCP-capable one

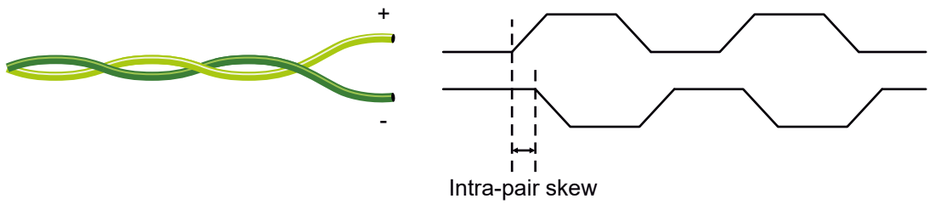
10.3. Pixel Accurate Reclocking

Signal reclocking is an essential 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:

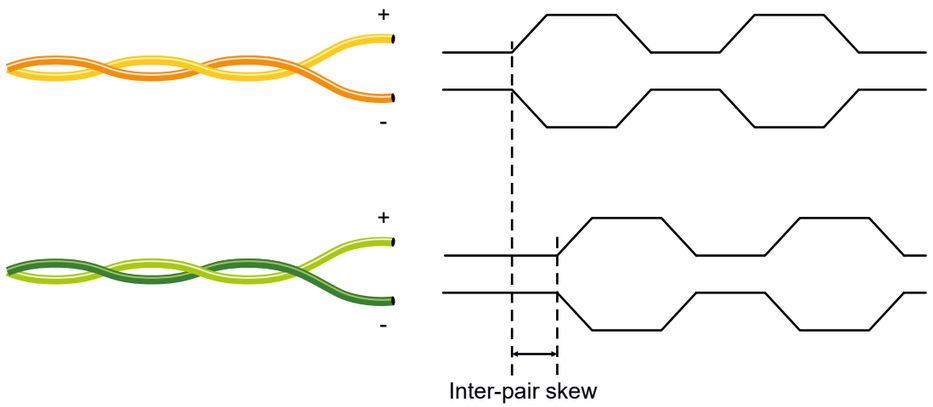
Intra-pair skew

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 the DVI cable. It results in jitter.



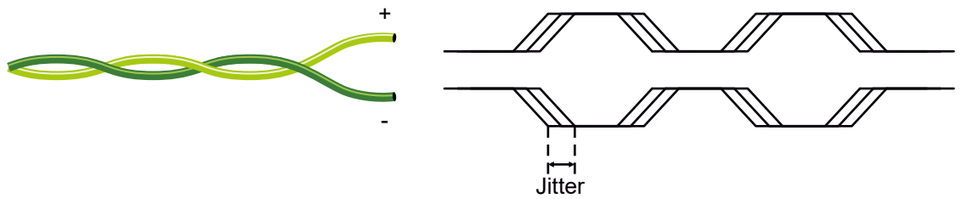
Inter-pair skew

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 in color shift in the picture or sync loss.



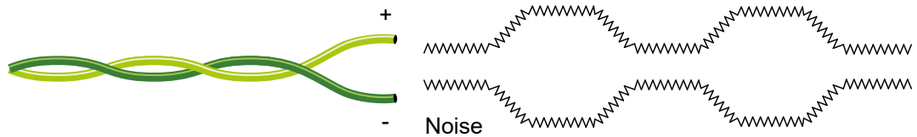
Jitter

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



Noise

Electromagnetic interference between other electronic devices such as mobile phones, motors, etc. and the 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, UKCA
Electrical safety	EN 62368-1:2020
EMC compliance (emission)	EN 55032:2015+A1:2020
EMC compliance (immunity)	EN 55035:2017+A11:2020
RoHS	EN 63000:2018
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/max)	4.4 W / 6.5 W
Heat dissipation (min/max)	15 BTU/h / 23 BTU/h

DP-TPS series

Power Consumption (min/max)	4.4 W / 7.6 W
Heat dissipation (min/max)	15 BTU/h / 26 BTU/h

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

Power Consumption (min/max)	4.4 W / 7.7 W
Heat dissipation (min/max)	15 BTU/h / 27 BTU/h

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	HDBaseTTM
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

* All standard VESA, CEA and other custom resolutions up to 300MHz (HDMI1.4) are supported.

** Not available for HDMI-TPS-TX226 model.

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 are subject to change without notice.

11.2. Content of the 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, MAC filter allowlist, Port blocking settings, TCP client settings (/CTRL/TCP)
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
Values of the variables

11.3. Factory Default Settings

Parameter	Setting/Value
Crosspoint settings (for SW4-TPS-TX240 and -TX240-Plus)	
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
Parameter	**Setting/Value**
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

#factory

11.4. Applied Ports (Network Settings)

The following ports are necessary to pass via a network switch/firewall for a proper working between the device and the softwares:

Purpose/function	Affected software	Protocol	Port nr.
Firmware update TFTP	LDU2	UDP	69
		UDP	49990
		UDP	49995
Device Discovery	LDC	UDP	224.0.0.251:5353
Remote IP	LDC	UDP	230.76.87.82:37421
Find me (LMDMP)	-	UDP	230.76.87.82:37422
LW2 protocol	-	TCP	10001
LW3 protocol	-	TCP	6107
HTTP port	-	TCP	80
RS-232 command injection	-	TCP	8001, 8002
IR command injection	-	TCP	9001, 9002, 9003, 9004

11.5. Cable Wiring Guide

Inputs and outputs of audio devices are symmetric or asymmetric. The main advantage of the symmetric lines is the better protection against the noise, therefore they are widely used in the professional audio industry. Symmetric audio is most often referred to as balanced audio, as opposed to asymmetric, which is referred to as unbalanced audio. Ligthware products are usually built with 5-pole Phoenix connectors, so we would like to help users assemble their own audio cables. See the most common cases below.

ATTENTION! Symmetric and asymmetric lines can be linked with passive accessories (e.g. special cables), but in this case half of the line level is lost.

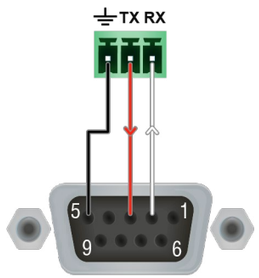
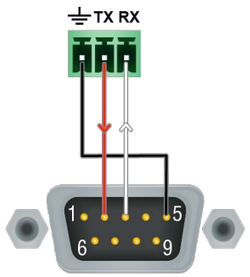
ATTENTION! There are numerous types of regularly used connector and cable types to connect audio devices. Please always make sure that a connector or cable fits your system before use.

ATTENTION! Never join the phase-inverted (negative, cold or -) poles (either right or left) to the ground or to each other on the output side, as this can damage the unit.

INFO: Use a galvanic isolation in case of a ground loop.

11.5.1. Serial Ports

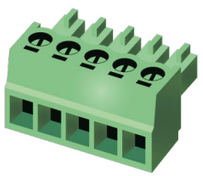
The device is built with a 3-pole Phoenix connector. See the examples below of connecting to a DCE (Data Circuit-terminating Equipment) or a DTE (Data Terminal Equipment) type device:

Lightware device and a DCE D-SUB 9 and Phoenix	Lightware device and a DTE D-SUB 9 and Phoenix
 2: TX data 3: RX data 5: Ground	 2: RX data 3: TX data 5: Ground

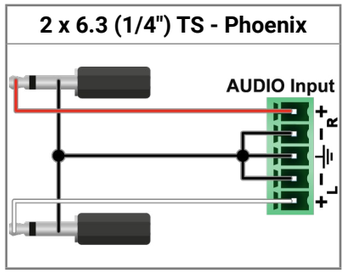
11.5.2. Audio Ports

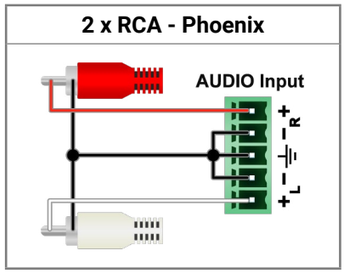
The Pinout of the 5-pole Phoenix Connector

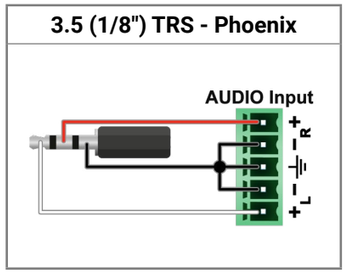
Pin nr.	Signal
1	Left+
2	Left-
3	Ground
4	Right-
5	Right+



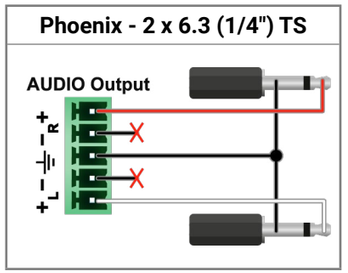
From Unbalanced Output to Balanced Input

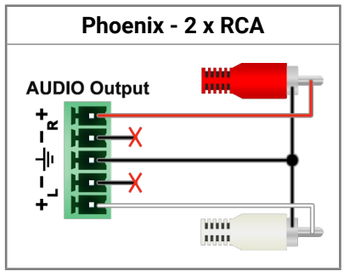


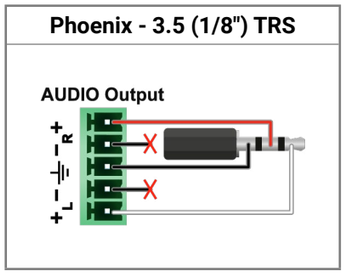




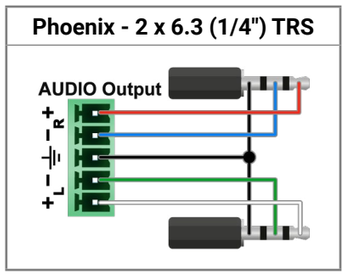
From Balanced Output to Unbalanced Input

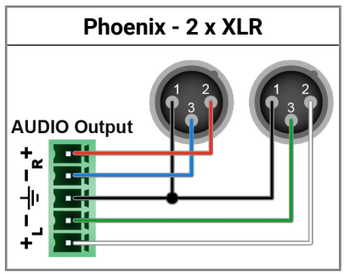


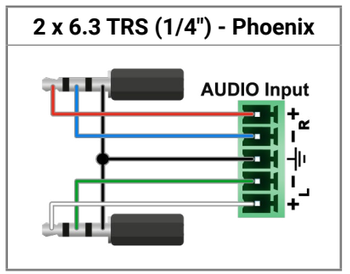


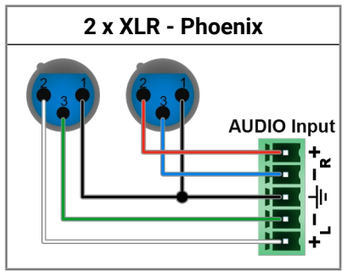


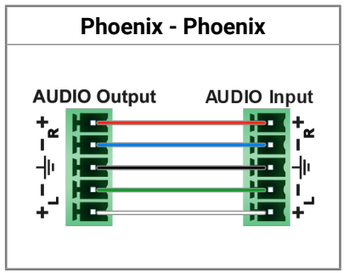
From Balanced Output to Balanced Input











11.6. Firmware Release Notes

The list below shows the released firmware packages with important notes.

v1.3.6b2

Release date: 2022-02-01

New feature:

- Added support for firmware update from a host PC which is in another subnet as the device.

Bugfix:

- Configuration backup and restore convert script fixed to handle uncommon Event Actions.

v1.3.4b1

Release date: 2021-07-20

New feature:

- Manufacturing support.

v1.3.3b2

Release date: 2021-07-19

New feature:

- Manufacturing support.

v1.3.2b3

Release date: 2021-05-05

New feature:

- Introduces "--test" option for the update CLI command. This "update test mode" checks communication with the device over various protocols. One can perform this verification step before actually starting the device update.

v1.3.1b2

Release date: 2021-03-08

Bugfix:

- Improved LDU2 firmware update process.
- Production EOLT support.

v1.3.0b6

Release date: 2021-02-23

New feature:

- Added Network HostName property (default: lightware-<serialnum>).
- Added properties in root node: FirmwareVersion, PackageVersion, MacAddress.
- Modified DeviceLabel property default text to LW_<productname>_<serialnum>
- Added LMDMP (Lightware Multicast Device Management Protocol) feature.
- Added new ConnectedSource property for media output nodes.
- Added method to send Wake On LAN packet (Advanced Control pack v3)
- Added Condition detect on property change to anything in Event Manager (Advanced Control pack v3)
- Added AND operator for Event Manager Conditions (Advanced Control pack v3)
- Added property to indicate FeaturePackVersion (Advanced Control pack v3)
- Added new method for CEC control button sendClick (Advanced Control pack v3) for SW4-TPS-TX240-Plus only!
- Added Macro capability (running partial device preset with tags) (Advanced Control pack v3) for SW4-TPS-TX240-Plus only!
- Added IP port and services filtering (Advanced Control pack v3) for SW4-TPS-TX240-Plus only!
- Added MAC filtering (Advanced Control pack v3) for SW4-TPS-TX240-Plus only!
- Added cleartext login function (disabled by default) (Advanced Control pack v3) for SW4-TPS-TX240-Plus only!
- Added Http message sending with sendHttpPost and sendHttpPut (target server IP, target filepath, header, body) (Advanced Control pack v3) for SW4-TPS-TX240-Plus only!
- Added LW3 command-salvo over Http POST (protocol.lw3) (Advanced Control pack v3) for SW4-TPS-TX240-Plus only!
- Added Permanent TCP clients with configurable target IP address, and Message recognizer for TCP clients (Advanced Control pack v3) for SW4-TPS-TX240-Plus only!
- Added Variable handling for Event Manager (Advanced Control pack v3) for SW4-TPS-TX240-Plus only!
- Added Condition triggering for Event Manager (Advanced Control pack v3) for SW4-TPS-TX240-Plus only!
- Added support for HDMI-TPS-TX226 product.

Bugfix:

- Minor performance improvements and modifications.

v1.2.1b1

Release date: 2021-01-28

Bugfix:

- Fixed issue with tick counter when the device is continuously operating for a very long time.
- Improved network compatibility with 10.x.x.x IP address range.

v1.2.0b16

Release date: 2019-08-15

New feature:

- Compatible for LDU2 only!
- Modified DP input driver to fix HDCP issue with MacBooks
- Firmware platform library updated
- CEC - sendCEC command (e.g. turn on the TV with Event Actions) for SW4-TPS-TX240-Plus only!
- Added 'Forced button lock' function to lock buttons via protocol command
- Improved GPIO detection

- Added 'User replaceable miniweb slot' to support built-in control webpage
- Modified RS-232 modes to support SendMessage in Control mode
- RS232 Minimal Recognizer for Cisco compatibility (Cisco Login) for SW4-TPS-TX240-Plus only!
- Added 'Dark mode' function to turn off front panel LEDs
- Added 'Disable default button function' option to support button customization in Event Manager
- Use LDU2 v1.2.5 or later for the upgrade!
- Sending IR codes (SendProntoHex e.g. send max. 200 Byte IR code with Event Actions) for SW4-TPS-TX240-Plus only!

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 and -TX240-Plus

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 and -TX226

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

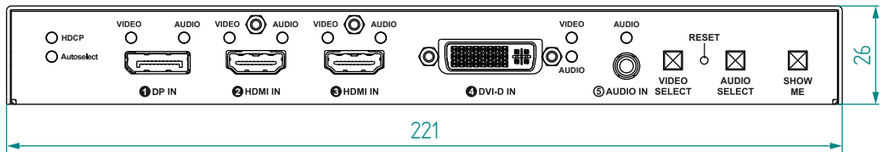
Audio/Video Ports

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

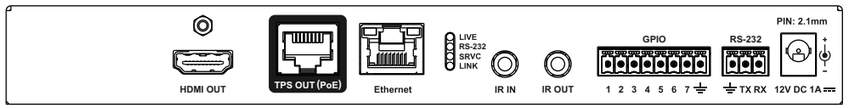
11.8. Mechanical Drawings

SW4-TPS-TX240 can be seen in the pictures, but the dimensions are the same for all models. Dimensions are in mm.

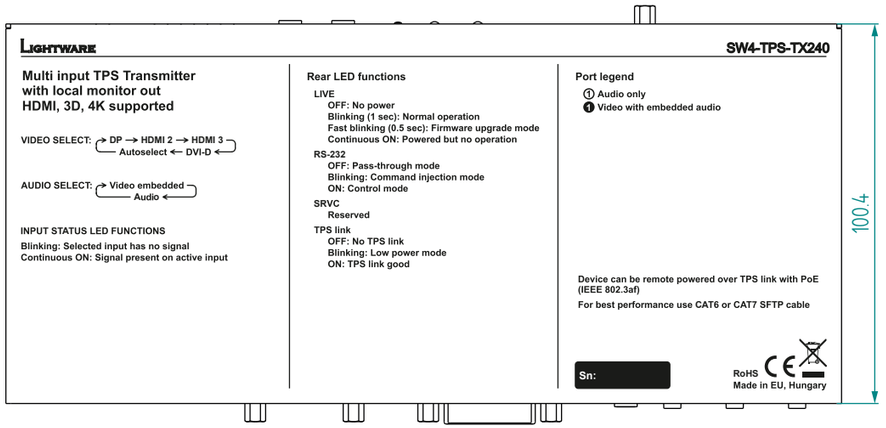
Front View



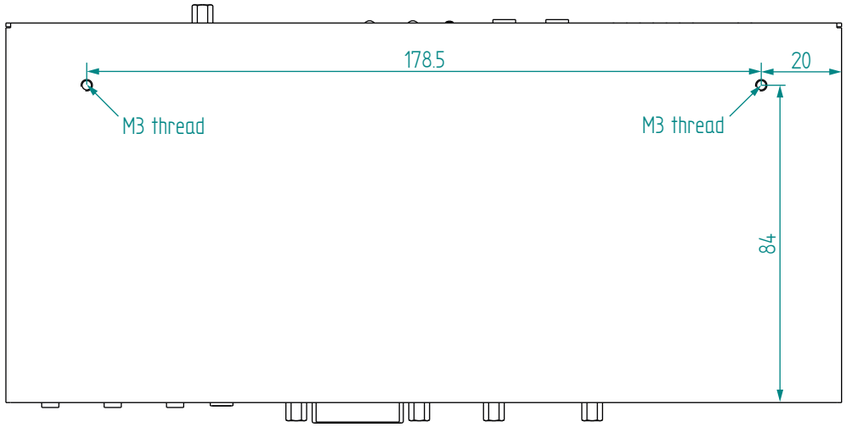
Rear View



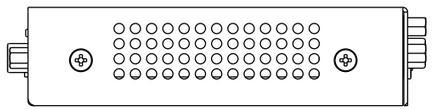
Top View



Bottom View



Side View



11.9. Maximum Extension Distances

DIFFERENCE: The table and values below do not refer to HDMI-TPS-TX226 model when it is remote powered. In that case, the maximum extension distance is 30 m.

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.

11.10. Factory EDID List

Legend

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 further firmware versions.

Universal EDIDs

The Universal EDIDs include many common resolutions with the features below:

- **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 signal with 4:2:0 sampling.

Mem	Resolution	Type	EDID features
F1	640 x 480p @ 60.00 Hz	D	
F2	848 x 480p @ 60.00 Hz	D	
F3	800 x 600p @ 60.32 Hz	D	
F4	1024 x 768p @ 60.00 Hz	D	
F5	1280 x 768p @ 50.00 Hz	D	
F6	1280 x 768p @ 59.94 Hz	D	
F7	1280 x 768p @ 75.00 Hz	D	
F8	1360 x 768p @ 60.02 Hz	D	
F9	1280 x 1024p @ 50.00 Hz	D	
F10	1280 x 1024p @ 60.02 Hz	D	
F11	1280 x 1024p @ 75.02 Hz	D	
F12	1400 x 1050p @ 50.00 Hz	D	
F13	1400 x 1050p @ 60.00 Hz	D	
F14	1400 x 1050p @ 75.00 Hz	D	
F15	1680 x 1050p @ 60.00 Hz	D	
F16	1920 x 1080p @ 50.00 Hz	D	
F17	1920 x 1080p @ 60.00 Hz	D	
F18	2048 x 1080p @ 50.00 Hz	D	
F19	2048 x 1080p @ 60.00 Hz	D	
F20	1600 x 1200p @ 50.00 Hz	D	
F21	1600 x 1200p @ 60.00 Hz	D	
F22	1920 x 1200p @ 50.00 Hz	D	
F23	1920 x 1200p @ 59.56 Hz	D	
F24	2048 x 1200p @ 59.96 Hz	D	
F29	1920 x 1080p @ 60.00 Hz	U	
F30	1440 x 480i @ 60.05 Hz	H	2chLPCM
F31	1440 x 576i @ 50.08 Hz	H	2chLPCM
F32	640 x 480p @ 59.95 Hz	H	2chLPCM
F33	720 x 480p @ 59.94 Hz	H	2chLPCM
F34	720 x 576p @ 50.00 Hz	H	2chLPCM
F35	1280 x 720p @ 50.00 Hz	H	2chLPCM
F36	1280 x 720p @ 60.00 Hz	H	2chLPCM
F37	1920 x 1080i @ 50.04 Hz	H	2chLPCM
F38	1920 x 1080i @ 50.00 Hz	H	2chLPCM
F39	1920 x 1080i @ 60.05 Hz	H	2chLPCM
F40	1920 x 1080i @ 60.05 Hz	H	2chLPCM
F41	1920 x 1080p @ 24.00 Hz	H	2chLPCM
F42	1920 x 1080p @ 25.00 Hz	H	2chLPCM
F43	1920 x 1080p @ 30.00 Hz	H	2chLPCM
F44	1920 x 1080p @ 50.00 Hz	H	2chLPCM
F45	1920 x 1080p @ 59.94 Hz	H	2chLPCM
F46	1920 x 1080p @ 60.00 Hz	H	2chLPCM
F47	1920 x 1080p @ 60.00 Hz	U	2chLPCM
F48	1920 x 1080p @ 60.00 Hz	U	2chLPCM, 8chLPCM, DD, DTS, AAC, DD+, DTS-HD, MLP, DST, WMAP
F49	1920 x 1080p @ 60.00 Hz	U	2chLPCM, 8chLPCM, DD, DTS, AAC, DD+, DTS-HD, MLP, DST, WMAP

Mem	Resolution	Type	EDID features
F90	1920 x 2160p @ 59.99 Hz	D	
F91	1024 x 2400p @ 60.01 Hz	D	
F94	2048 x 1536p @ 60.00 Hz	D	
F96	2560 x 1600p @ 59.86 Hz	D	
F97	3840 x 2400p @ 24.00 Hz	D	
F98	1280 x 720p @ 60.00 Hz	H	2chLPCM
F99	1920 x 1080p @ 60.00 Hz	H	2chLPCM
F100	1024 x 768p @ 60.00 Hz	H	2chLPCM
F101	1280 x 1024p @ 50.00 Hz	H	2chLPCM
F102	1280 x 1024p @ 60.02 Hz	H	2chLPCM
F103	1280 x 1024p @ 75.02 Hz	H	2chLPCM
F104	1600 x 1200p @ 50.00 Hz	H	2chLPCM
F105	1600 x 1200p @ 60.00 Hz	H	2chLPCM
F106	1920 x 1200p @ 59.56 Hz	H	2chLPCM
F107	2560 x 1440p @ 59.95 Hz	H	2chLPCM
F108	2560 x 1600p @ 59.86 Hz	H	2chLPCM
F109	3840 x 2400p @ 24.00 Hz	H	2chLPCM
F110	3840 x 2160p @ 24.00 Hz	H	2chLPCM
F111	3840 x 2160p @ 25.00 Hz	H	2chLPCM
F112	3840 x 2160p @ 30.00 Hz	H	2chLPCM
F118	3840 x 2160p @ 30.00 Hz	U	2chLPCM
F119	3840 x 2160p @ 30.00 Hz	U	2chLPCM, 8chLPCM, DD, DTS, AAC, DD+, DTS-HD, MLP, DST, WMAP
F133	4096 x 2160p @ 60.00 Hz	4	2chLPCM

11.11. Hashtag Keyword List

This user's manual contains keywords with hashtags (#) to help you 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 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
#http	Http post/put messaging, salvo commands
#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
#login	Cleartext login feature
#macfilter	MAC filtering (IT security)
#macro	Macro-handling
#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

Hashtag Keyword	Description
#testpattern	Test pattern (no sync screen) settings
#portblock	IP port blocking (IT security)
#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
#tcprecognizer	TCP message recognizer-related settings
#tpsmode	TPS (HDBaseT) mode setting
#variables	Variable-management

11.12. Further Information

Limited Warranty Statement

1. Lightware Visual Engineering PLC (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 product's warranty period.

Document Revision History

Rev.	Release date	Changes	Editor
1.0	03-07-2015	Initial version	Laszlo Zsedenyi
⋮			
3.3	08-07-2022	Changes in the Box contents section	Tamas Forgacs
3.4	16-09-2022	Bulk Management chapters added, minor corrections	Nikolett Keindl
3.5	19-10-2022	Minor corrections for HTML export	Laszlo Zsedenyi
3.6	21-06-2023	Minor corrections	Nikolett Keindl
3.7	12-12-2023	Specifications updated	Nikolett Keindl

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