visual engineering
LIGHTWARE

UMX-TPS-TX120
UMX-TPS-TX130
UMX-TPS-TX140
WP-UMX-TPS-TX120-US
WP-UMX-TPS-TX130-US

User's Manual

SAFETY INSTRUCTIONS

Class II apparatus construction.

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

To disconnect 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.

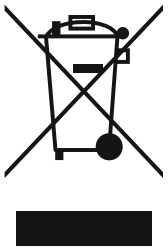
There are no user-serviceable parts inside of the unit. Removal of the bottom cover will expose dangerous voltages. To avoid personal injury, do not remove the bottom cover. Do not operate the unit without the cover installed.

The apparatus shall not be exposed to dripping or splashing and that no objects filled with liquids, such as vases, shall be placed on the apparatus.

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

WEEE (Waste Electrical & Electronic Equipment)

Correct Disposal of This Product



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

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

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

CE

DECLARATION OF CONFORMITY

We,

Lightware Kft. 1071 Budapest Peterdy str. 15 HUNGARY

as manufacturer declare, that the products

UMX-TPS-TX120
UMX-TPS-TX130
UMX-TPS-TX140
WP-UMX-TPS-TX120-US
WP-UMX-TPS-TX130-US
(Computer Monitor Extender)

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

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

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

Date: 02 September 2014

Name: Gergely Vida (Managing Director)

Signed: Vida A. Gergely

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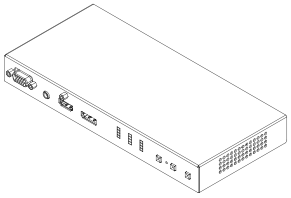
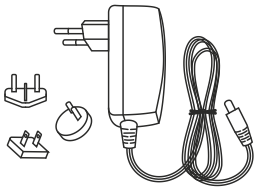
1. Introduction

Thank You for choosing Lightware UMX-TPS transmitter. The products have HDBaseT™ integration with additional Lightware developments. UMX-TPS devices transmit universal video at a resolution up to 4K, audio and control up to 170 m distance over a single CAT cable. The transmitters are compatible with Lightware TPS matrix boards and other TPS products.

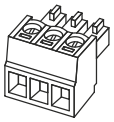
1.1. Box contents (UMX-TPS transmitters)



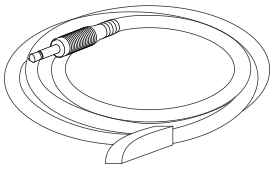
Transmitter unit



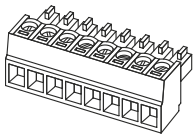
+12V DC adaptor with interchangeable plugs



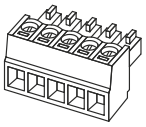
Phoenix® Combicon 3-pole connector



Infrared transmitter with 3.5 mm TS male connector



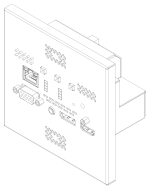
Phoenix® Combicon 8-pole connector*



Phoenix® Combicon 5-pole connector**

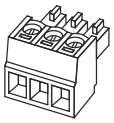
* Only for UMX-TPS-TX130 and UMX-TPS-TX140
** Only for UMX-TPS-TX140

1.2. Box contents (WP-UMX-TPS transmitters)



Transmitter unit

Fixing screws for mounting (4 pcs.)



Phoenix® Combicon 3-pole connector

1.3. Description

This transmitter was designed to extend digital and analog video signals (e.g. VGA, YPrPb, HDMI 1.4 and DP 1.1) and audio signals (analog stereo audio from local inputs or embedded 7.1 HBR audio). Video signals with HDCP encryption are also supported. Analog signals (both audio and video) are converted to digital format and the audio signals can be de-embedded from the video. Thus many combination of the audio/video signals are available to transmit.

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

Remote powering (Power over Ethernet) is available through a single CAT cable, but local power supply can also be used. UMX-TPS transmitter can be mounted on a rack shelf or used standalone, while the WP-UMX-TPS transmitters designed to place into a wall or furniture. The transmitters are compatible with both the HDBaseT™ extenders and matrix switchers.

1.4. Model comparison

The available models have different features depending on their design. Following table contains the most important differences of the models:

	Video ports				Audio ports		Interface ports			
	HDMI input	VGA input	DVI-I input	DP input	Jack 3.5 in	Phoenix in	Ethernet	Infra	RS-232	GPIO
UMX-TPS-TX120	✓	✓	-	-	✓	-	✓	✓	✓	-
UMX-TPS-TX130	✓	✓	✓	-	✓	-	✓	✓	✓	✓
UMX-TPS-TX140	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WP-UMX-TPS-TX120-US	✓	✓	-	-	✓	-	✓	✓	✓	-
WP-UMX-TPS-TX130-US	✓	✓	-	✓	✓	-	✓	✓	✓	-

Table 1-1. Features of UMX-TPS and WP-UMX-TPS devices

1.5. Compatible devices

The transmitters are compatible with the following receivers and input boards:

- MX modular matrix frames with MX-TPS-IB
- HDMI-TPS-RX90
- DVI-HDCP-TPS-RX95
- HDMI-TPS-RX95

Info: The remote power feature of TPS-RX95 receivers differs from the UMX-TPS-TX100 series thus RX95 can be remote powered only by TX95 transmitter. UMX-TPS-TX100 series contains PoE-compatible remote power function, TX/RX95 family is not PoE-compatible.

1.6. Features

Certain features depend on the configuration of the model. For more information about the models see section 1.4 on page 11.

- **3D and 4K support** – High bandwidth allows extension of resolutions up to 4K and even 3D sources and displays are supported.
- **Signal transmission up to 170 m** – Video and audio signal transmission (DVI, HDMI, VGA or DisplayPort, and Ethernet + RS-232 + Infra-Red over a single CAT5e…CAT7e cable.
- **Various audio and video connectors** – DVI-I, HDMI, VGA, DisplayPort, Stereo jack, PHOENIX 1x5 pole.
- **GPIO control port** – 7 GPIO pins operating at TTL digital signal levels and can be controlled with both LW2 and LW3 commands.
- **HDCP compliant** – UMX-TPS-TX100 series fulfils HDCP standard. HDCP capability on the digital video inputs can be disabled when non-protected content is extended.
- **Advanced EDID management** – User can emulate any EDID on the input ports, read out and store any monitor's EDID in the internal memory.
- **Pixel Accurate Reclocking** – (removes jitter caused by long cables) The output has a clean, jitter free signal, eliminating signal instability and distortion caused by long cables or connector reflections.
- **Frame detector and signal analysis** – Using Lightware Device Controller software 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.
- **Deep Color support and conversion** – It is possible to transmit the highest quality 36-bit video streams for perfect color reproduction.
- **DVI/HDMI conversion** – The transmitter is able to convert from HDMI to DVI signals so that you can watch HDMI videos on your computer display without audio.
- **Bi-directional RS-232 pass-through** – AV systems can also contain serial port controllers and controlled devices. Serial port pass-through supports any unit that works with standard RS-232.
- **Remote power** – The transmitters are PoE-compatible and can be powered locally by the supplied power adaptor, or remotely via the TPS connection (through the CATx cable) with a compatible Power Source Equipment.
- **Locking DC connector** – Special plug of wall adaptor ensures safe power supply. This type of connector prevents unwanted extractions.
- **Separate Audio and Video switching** – Video and audio signals are separated and can be switched independently.
- **Analog Audio and Video A/D conversion** – Analog audio and video signals are converted to digital before being sent to the output.
- **Input (video & audio) status LEDs** – Front panel LEDs give feedback about state of the unit and the video and audio signals.
- **Accepts analog and digital audio signals** - Accepts analog stereo; 5.1 S/PDIF and even 7.1 HDMI embedded audio signals. Analog signals are converted to digital format and the digital or digitized analog audio can be embedded in the video stream.
- **Auto-switch function for video and audio inputs** – Autoselect mode with or without priority can toggle between inputs. It helps the handling of the transmitter and installation of new devices.

1.7. Typical applications

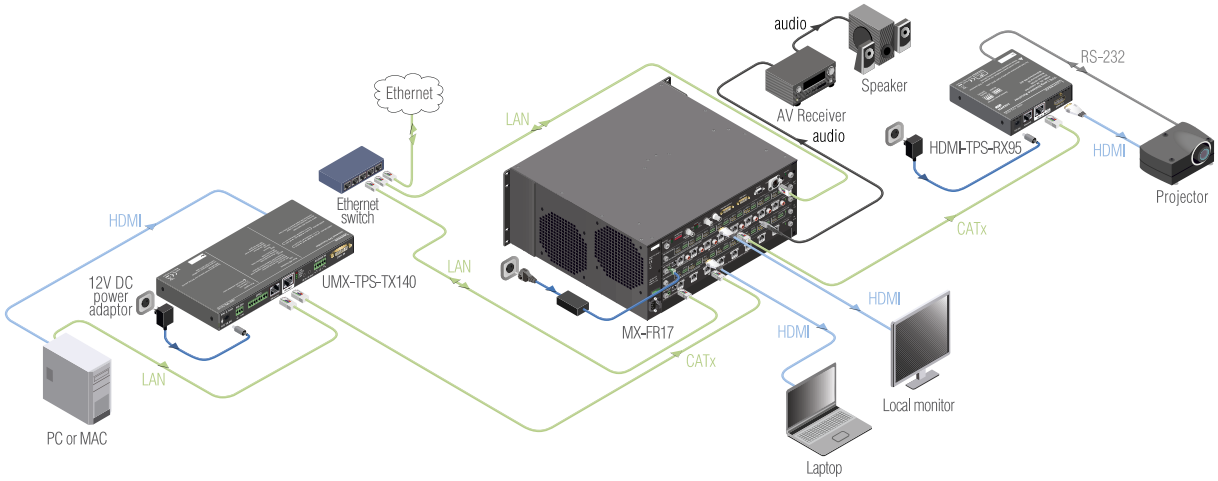


Figure 1-1. Application of UMX-TPS transmitter with an MX-FR17 matrix

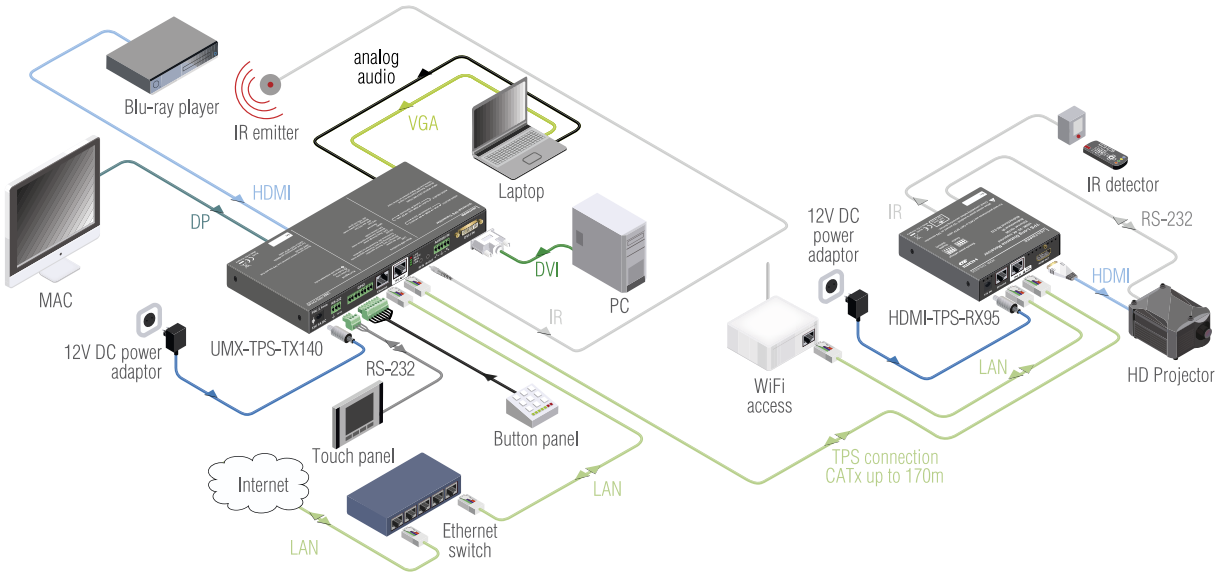


Figure 1-2. A stand-alone application with an HDMI-TPS-RX95 receiver

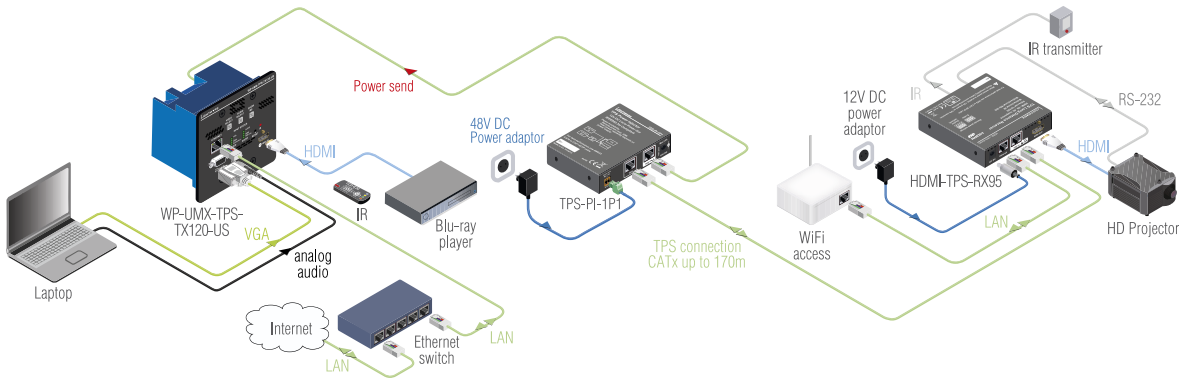
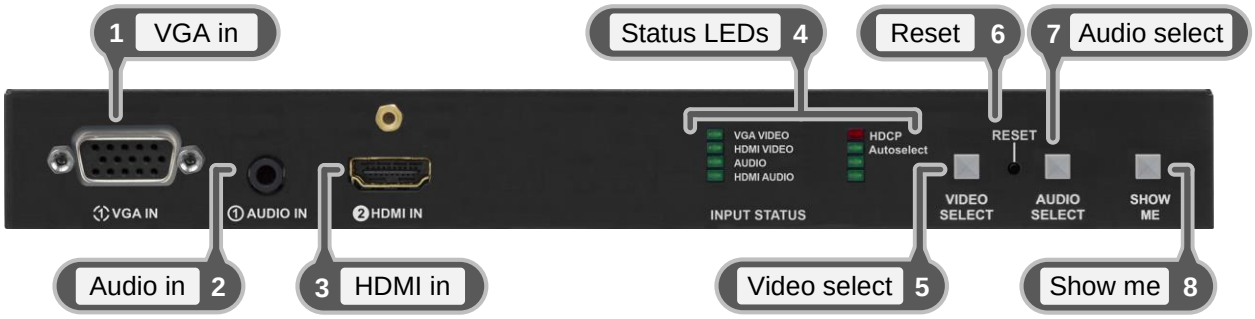


Figure 1-3. Stand-alone application with a WP-UMX-TPS-TX120-US

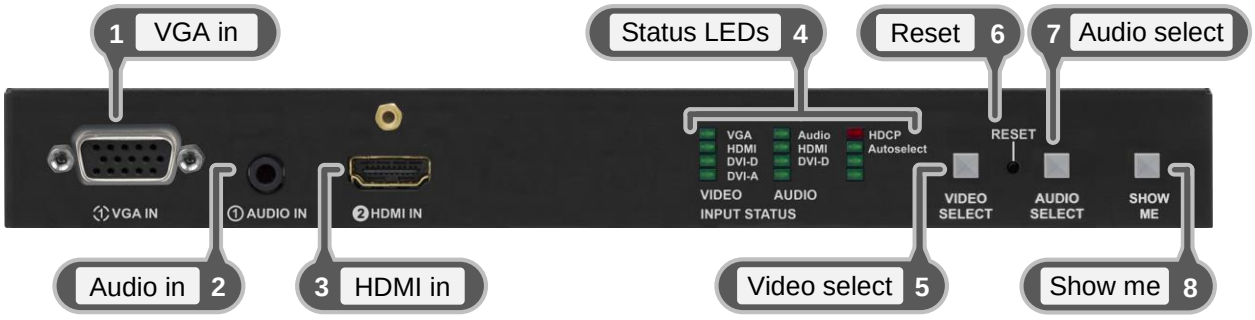
2. Controls and connections

2.1. Front view

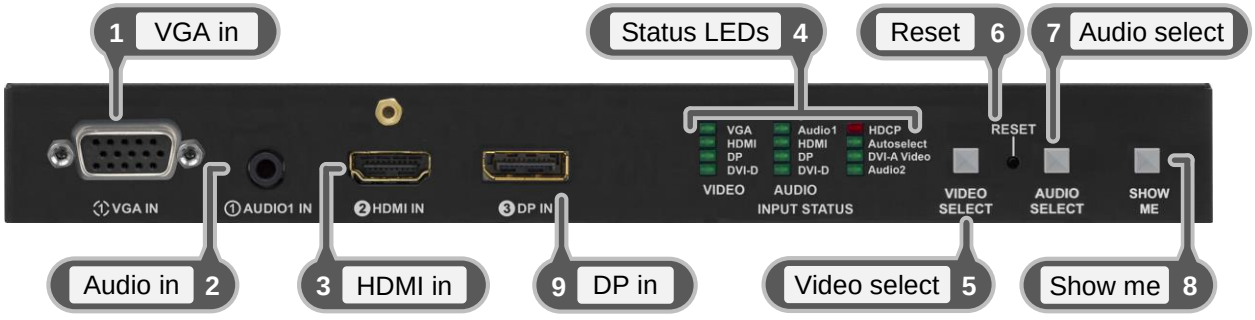
UMX-TPS-TX120



UMX-TPS-TX130

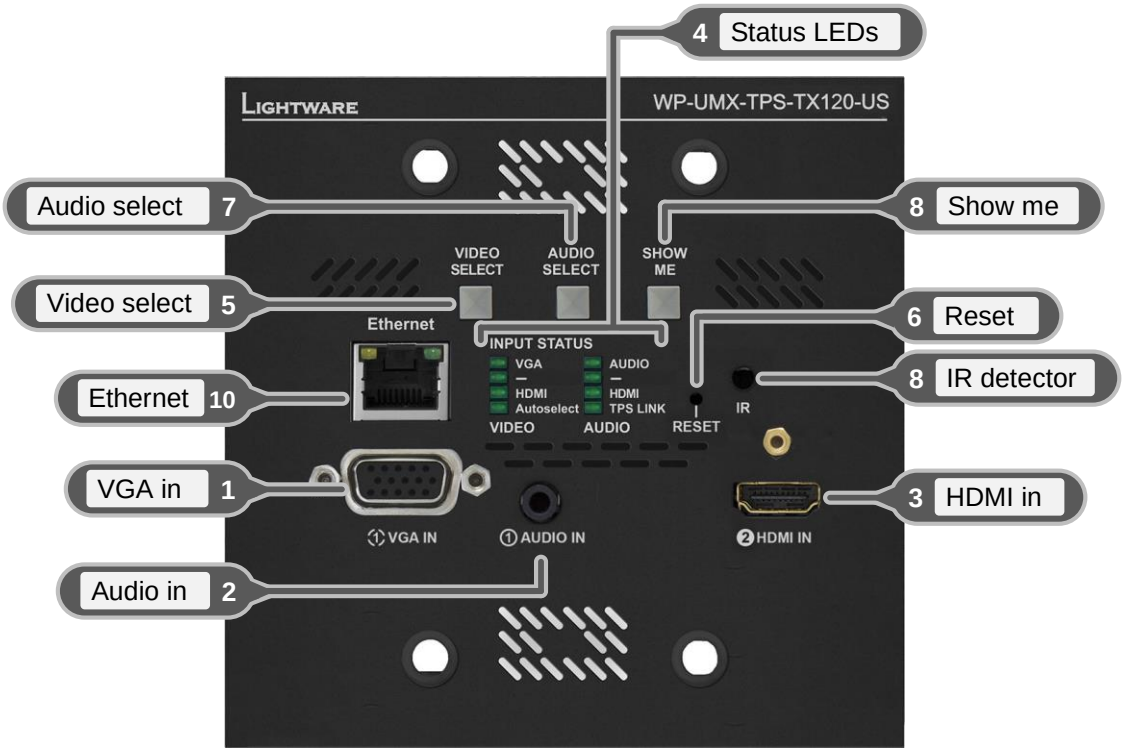


UMX-TPS-TX140

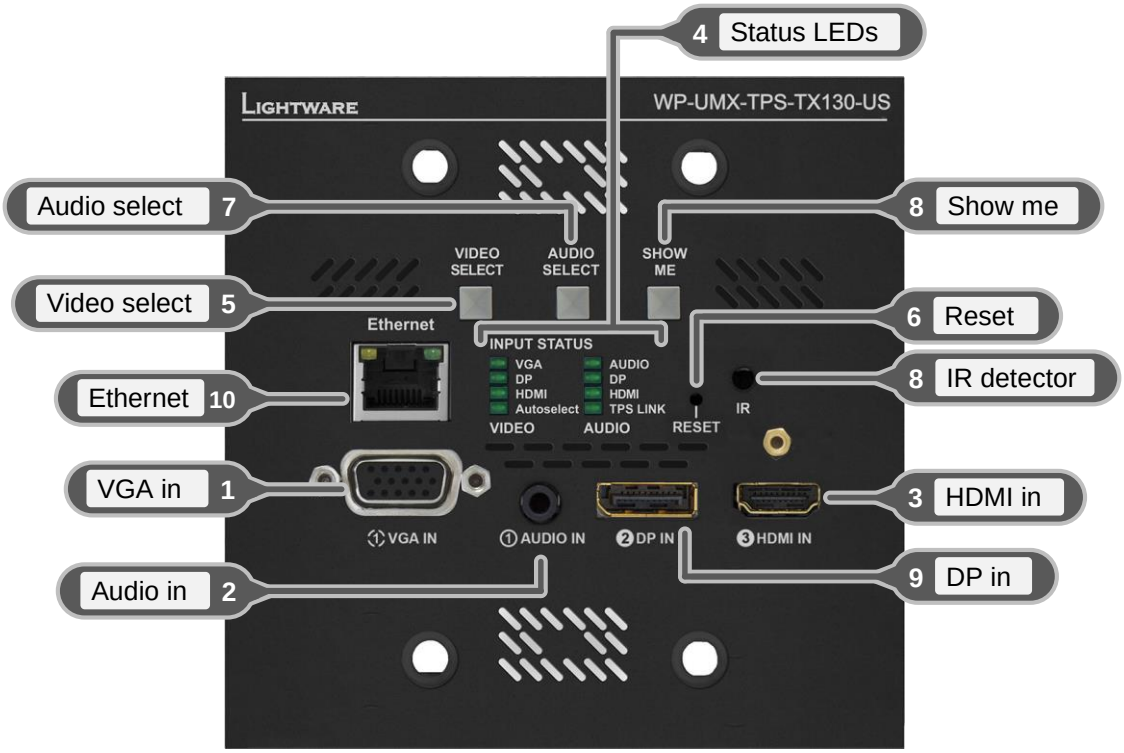


Info: The number before the port name is the port number used in LW3 protocol.
E.g. ❷ **HDMI IN** *means the video port number for the HDMI input port is P2.*

WP-UMX-TPS-TX120-US



WP-UMX-TPS-TX130-US



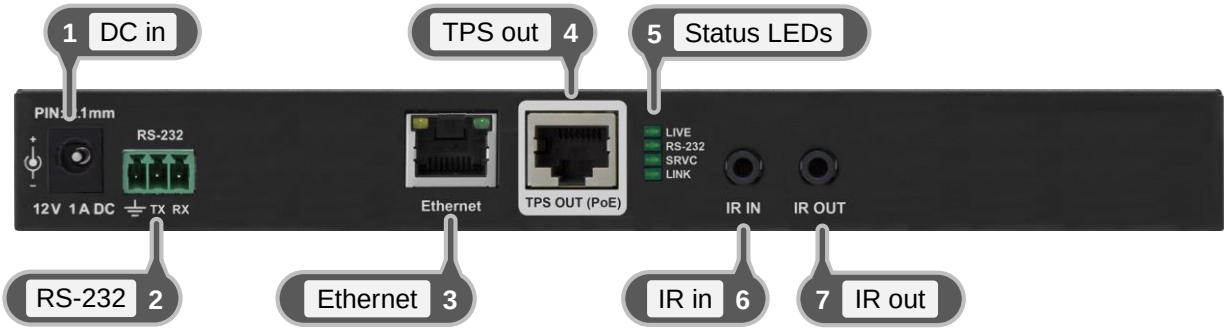
2.2. Front view legend

1	**VGA in**	Connect a VGA cable between the analog video source and the transmitter unit. Using a VGA cable where all the pins are wired (DDC channel) is highly recommended. Pin assignment can be found in section 2.5.4 on page 20.
2	**Audio in / Audio1 in**	3.5 mm Jack connector for asymmetric analog audio input signal. Pin assignment can be found in section 2.5.10 on page 22.
3	**HDMI in**	Connect a HDMI cable between the source and the transmitter. Applied cable shall not be more, than 30 m (when signal is 1080p) and 15 m (when signal is 4K). Pin assignment can be found in section 2.5.2 on page 19.
4	**Status LEDs**	The LEDs give feedback about the state of the unit, the video and audio signals. For more information see section 5.1 on page 30.
5	**Video select**	Switching among video inputs is available with this button.
6	**Reset**	Reset button reboots the extender. This is the same as disconnecting the device from the power source and reconnecting it again.
7	**Audio select**	Switching between audio inputs is available with this button.
8	**Show me**	Special functions are available with this button (switch to bootload mode, enable DHCP, restore factory default settings). For details about the special functions see the section 5.6 on page 38.
9	**DP in**	DisplayPort input connector (only on UMX-TPS-TX140 and WP-UMX-TPS-TX130-US). Applied cable shall not be more, than 30 m (at 2.7 Gbps data speed). Pin assignment can be found in section 2.5.3 on page 20.
10	**Ethernet**	Front-side locking RJ45 connector (only on WP-UMX-TPS transmitters) for Ethernet communication. The typical way of installation is when LAN is connected to the receiver side, and the Ethernet port on the wall plate can be used for a Laptop or PC.

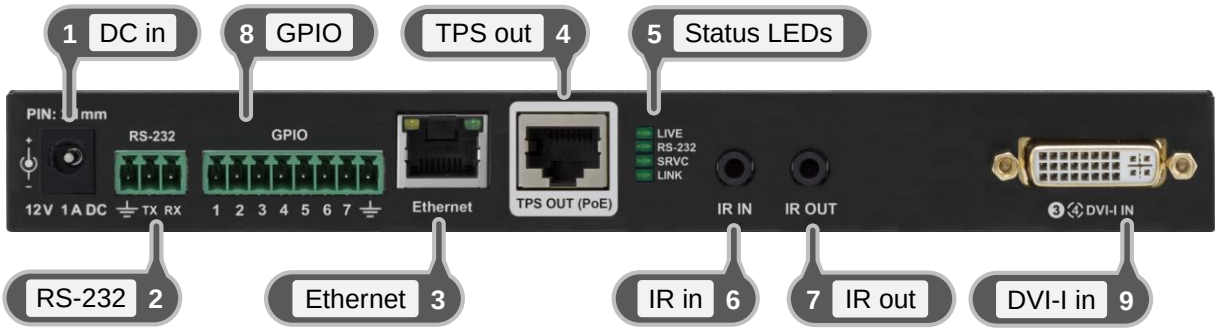
Important! *Please do not cover the ventilation holes on the front panel of the wall plates; ensure the proper airflow.*

2.3. Rear view

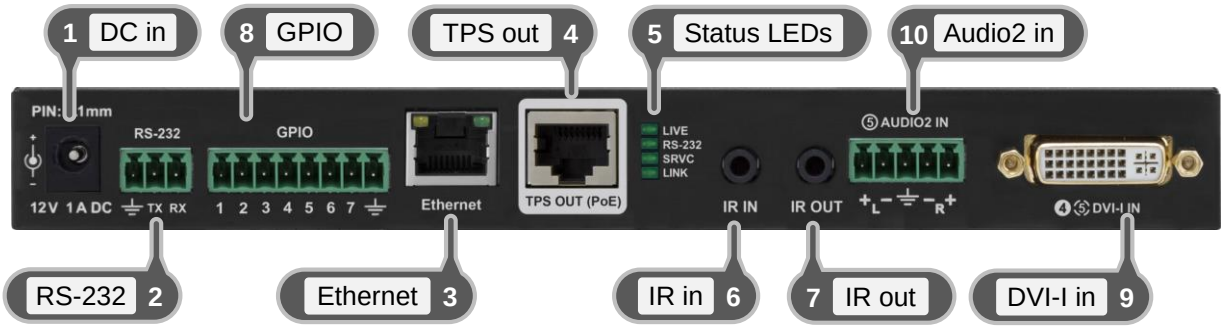
UMX-TPS-TX120



UMX-TPS-TX130



UMX-TPS-TX140



WP-UMX-TPS-TX120-US and WP-UMX-TPS-TX130-US

2.4. Rear view legend

1 **DC in**	**For UMX-TPS transmitters:** Power the device remotely by a PoE-compatible power injector, like Lightware's TPS-PI-1P1 (recommended) product. If the device has to be powered by a local adaptor, connect the output of the supplied +12V DC power adaptor or use Lightware's rack mountable Power supply unit (PSUx10-200-12V or PSUx20-400-12V). **For WP-UMX-TPS transmitters:** Power the device remotely by a PoE-compatible power injector, like Lightware's TPS-PI-1P1 (recommended) product. If the device has to be powered by a local adaptor, connect the output (+48 V, 1A) to the 2-pole Phoenix® connector on the rear of the wall plate. Using Lightware's PSU-48VP1 power adaptor is highly recommended.
2 **RS-232**	3-pole Phoenix connector for RS-232 serial port. Pin assignment can be found in section 2.5.8 on page 22.
3 **Ethernet**	Locking RJ45 connector. Remote control port for connecting the extender to a Local Area Network (LAN). Pin assignment can be found in section 2.5.5 on page 21.
4 **TPS out**	Locking RJ45 connector. Connect a twisted pair cable between the transmitter and the receiver. Remote powering also happens through this connector. Pin assignment can be found in section 2.5.7 on page 21. Maximum twisted pair distances can be found in section 11.3 on page 122.
5 **Status LEDs**	The LEDs give immediate feedback about device's state, RS-232 and TPS link state. For more information see section 5.2 on page 31.
6 **IR in**	3-pole TRS connector, also known as 3.5 mm (1/8") jack plug for optional IR receiver only. Pin assignment can be found in section 2.5.10 on page 22.
7 **IR out**	3-pole TRS connector, also known as 3.5 mm (1/8") jack plug for optional IR transmitter only. Pin assignment can be found in section 2.5.10 on page 22.
8 **GPIO**	8-pole Phoenix connector for configurable general purpose input/output ports. Pin assignment can be found in section 2.5.10 on page 22.
9 **DVI-I in**	29-pole DVI-I connector for DVI-D and DVI-A signal (only on UMX-TPS-TX130 and UMX-TPS-TX140). Applied cable shall not be more, than 30 m (when signal is 1080p) and 15 m (when signal is 4K). Pin assignment can be found in section 2.5.1 on page 19.
10 **Audio2 in**	5-pole Phoenix connector (only on UMX-TPS-TX140) for balanced analog audio input. Pin assignment can be found in section 2.5.10 on page 22.

2.5. Electrical connections

2.5.1. DVI input

UMX-TPS-TX140 provides a 29-pole DVI-I connector as an input. This way, user can plug in any DVI connector; analog signals (such as VGA or RGBHV) are put through an A/D conversion. Always use high quality DVI cable for connecting sources.

Pin	Signal	Pin	Signal	Pin	Signal
1	TMDS Data2-	**9**	TMDS Data1-	**17**	TMDS Data0-
2	TMDS Data2+	**10**	TMDS Data1+	**18**	TMDS Data0+
3	TMDS Data2 Shield	**11**	TMDS Data1 Shield	**19**	TMDS Data0 Shield
4	*n.c.*	**12**	*n.c.*	**20**	*n.c.*
5	*n.c.*	**13**	*n.c.*	**21**	*n.c.*
6	DDC Clock	**14**	+5V Power	**22**	TMDS Clock Shield
7	DDC Data	**15**	GND (for +5V)	**23**	TMDS Clock+
8	Analog Vertical Sync	**16**	Hot Plug Detect	**24**	TMDS Clock-
C1	Analog Red	**C2**	Analog Green	**C3**	Analog Blue
C4	Analog Horizontal Sync	**C5**	GND		

Table 2-1. DVI-I connector pin assignments

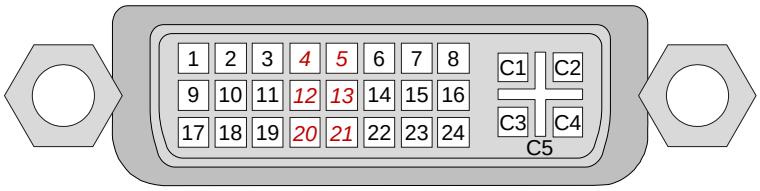
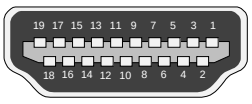
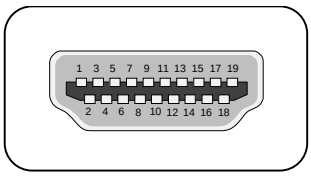


Figure 2-1. DVI-I connector

2.5.2. HDMI input



HDMI Type A receptacle



HDMI Type A Plug

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

Table 2-2. HDMI connector pin assignments

2.5.3. DisplayPort input

UMX-TPS-TX140 and WP-UMX-TPS-TX130-US provide a DisplayPort input connector.

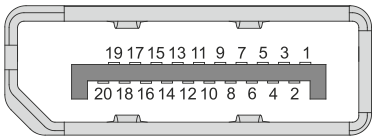


Figure 2-2. DisplayPort connector

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

Table 2-3. DisplayPort connector pin assignments

2.5.4. VGA input

The transmitters provide a standard 15-pole D-SUB female connector for VGA input. Always use high quality VGA cable for connecting sources and displays; using a VGA cable where all the pins are wired (DDC channel) is highly recommended.

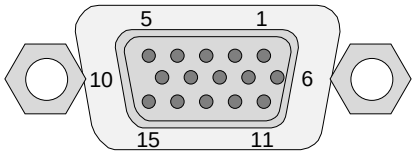


Figure 2-3. D-SUB 15 pole female connector (DE15F)

Pin nr.	Name	Description
1	RED	Red Video (75 ohm, 0.7 V p-p)
2	GREEN	Green Video (75 ohm, 0.7 V p-p)
3	BLUE	Blue Video (75 ohm, 0.7 V p-p)
4	ID2	Monitor ID Bit (Not used, internally connected to Pin 5)
5	GND	Ground
6	RGND	Red Ground (Internally connected to Pin 5)
7	GGND	Green Ground (Internally connected to Pin 5)
8	BGND	Blue Ground (Internally connected to Pin 5)
9	KEY	Optional +5V output from graphics card
10	SGND	Sync Ground (Internally connected to Pin 5)
11	ID0	Monitor ID Bit 0 (Not used, internally connected to Pin 5)
12	SDA	I^2C bidirectional data line
13	HSYNC	Horizontal Sync
14	VSYNC	Vertical Sync which works also as data clock
15	SCL	I^2C data clock in DDC2

Table 2-4. D-sub connector pin assignment for standard VGA

2.5.5. DC +12V connection (UMX-TPS transmitters)

UMX-TPS transmitters have a locking DC connector to establish robust and safe power connection. After plugging it in, turn the plug clockwise as you can see in the picture below.

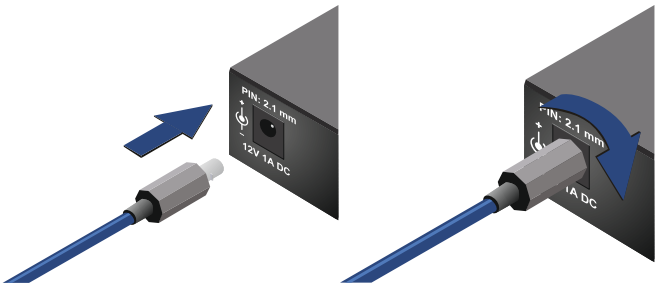


Figure 2-4. Locking DC plug and connector

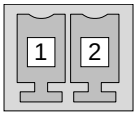
Do not forget to turn the plug counterclockwise before disconnecting the power adaptor.

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

Always use the supplied +12V power adaptor or Lightware's rack mountable power supply.

2.5.6. DC +48 V connection (WP-UMX-TPS transmitters)

WP-UMX-TPS transmitters have a 2-pin Phoenix DC input power connector.



Pin nr.	Signal
1	+
2	-

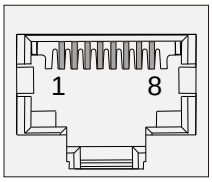
Figure 2-5. DC +48V DC plug and connector

Compatible plug type

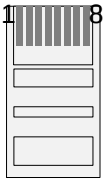
Phoenix® Combicon series (3.5mm pitch 5-pole), type: MC 1.5/5-ST-3.5, order #: 1840395.

2.5.7. TPS output connector

The transmitters provide standard RJ45 connectors for TPS Output.



RJ45 receptacle



RJ45 plug

The recommended termination is based on TIA/EIA T 568 A or TIA/EIA T 568 B standards.

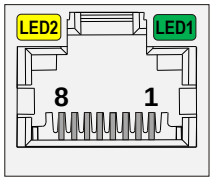
Pin	TIA/EIA T568 A	color and name	TIA/EIA T568 B	color and name
1		white/green stripe		white/orange stripe
2		green solid		orange solid
3		white/orange stripe		white/green stripe
4		blue solid		blue solid
5		white/blue stripe		white/blue stripe
6		orange solid		green solid
7		white/brown stripe		white/brown stripe
8		brown solid		brown solid

Table 2-5. Recommended termination of TP cables

2.5.8. Ethernet port

The Ethernet port can be connected to a LAN hub, switch or router by a CATx cable. However both cable types (straight or cross) are supported and handled by the device, below pin assignment is recommended.

	LED1 (green)	LED2 (yellow)
OFF	10 Mbit/s	not linked
Blink	-	activity
ON	100 Mbit/s	no activity

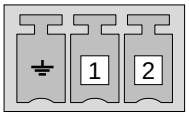


Pin nr.	Name	Wire color
1	TX +	Green stripe
2	TX -	Green
3	RX +	Orange stripe
4	Not used	Blue
5	Not used	Blue stripe
6	Rx -	Orange
7	Not used	Brown stripe
8	Not used	Brown

Figure 2-6. RJ45 connector and pin assignments for Ethernet

2.5.9. RS-232 connector

The transmitters contain a 3-pole Phoenix connector, which is used for RS-232 serial connection. The transmitter has pass-through function, or can be remote controlled.



Pin nr.	Signal
Ground	
1	TX data
2	RX data

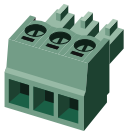


Figure 2-7. RS-232 plug and connector pin assignments

Compatible plug type

Phoenix® Combicon series (3.5mm pitch, 3-pole)

Type: MC 1.5/3-ST-3.5, order nr.: 691361100003 (Würth)

2.5.10. IR connector (UMX-TPS transmitters)

IR receiver and IR transmitter can be connected to the UMX-TPS transmitter 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.

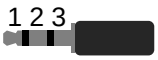
1 2 3 **Receiver – 3-pole-TRS**		1 3 **Transmitter – 2-pole-TS**	
1 Tip	IR Input -	1 Tip	IR Output +
2 Ring	GND	2 Ring	IR Output -
3 Sleeve	IR Input +	3 Sleeve	IR Output -

Table 2-6. TRS/TS connector pin assignment

Info: Transmitter’s Ring pole is optional. If your IR transmitter has three pole TRS plug, then the Ring and the Sleeve are the same signal (Output -).

2.5.11. Audio input (Audio1)

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



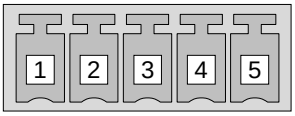
Pin nr.	Signal
1	Left
2	Right
3	Ground

Figure 2-8. 3.5 mm Jack audio plug pin assignments

Info: The input is named „Audio1" on UMX-TPS-TX140.

2.5.12. Audio2 input (UMX-TPS-TX140)

5-pole Phoenix connector is used for symmetrical analog audio input. Asymmetrical audio signals can be connected as well. For asymmetrical input connect + and ground to the source and connect – to the ground.



Pin nr.	Signal
1	Left+
2	Left-
3	Ground
4	Right-
5	Right+

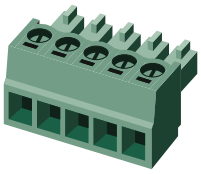


Figure 2-9. Audio2 input connector and plug pin assignments

Compatible plug type

Phoenix® Combicon series (3.5mm pitch 5-pole), type: MC 1.5/5-ST-3.5, order #: 1840395.

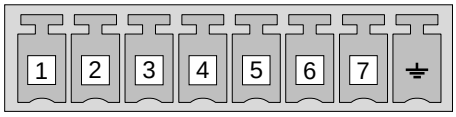
2.5.13. GPIO – General purpose input/output ports (UMX-TPS transmitters)

UMX-TPS-TX130 and TX140 transmitters have seven GPIO pins, which 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). The signal levels are the followings:

	Voltage [V]	Current, max. [mA]
Low level	0 - 0,8	30
High level	2 - 5	18

Table 2-7. Signal level of GPIO pins (values refer to each pin)

Info: The total available current of the controller is 180 mA.



Pin nr.	Signal
1	Configurable
2	
3	
4	
5	
6	
7	
Ground	

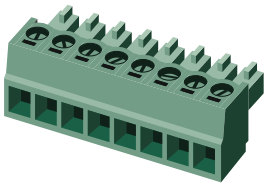


Figure 2-10. GPIO connector and plug pin assignments

Compatible plug type

Phoenix® Combicon series (3.5mm pitch 8-pole), type: MC 1.5/8-ST-3.5, order #: 1840421.

3. Technologies

3.1. Understanding EDID

3.1.1. Basics

EDID stands for Extended Display Identification Data. Simply put, EDID is the passport of display devices (monitors, TV sets, projectors). It contains information about the display's capabilities, such as supported resolutions, refresh rates (these are called Detailed Timings), the type and manufacturer of the display device, etc.

After connecting a DVI source to a DVI display, the source reads out the EDID to determine the resolution and refresh rate of the image to be transmitted.

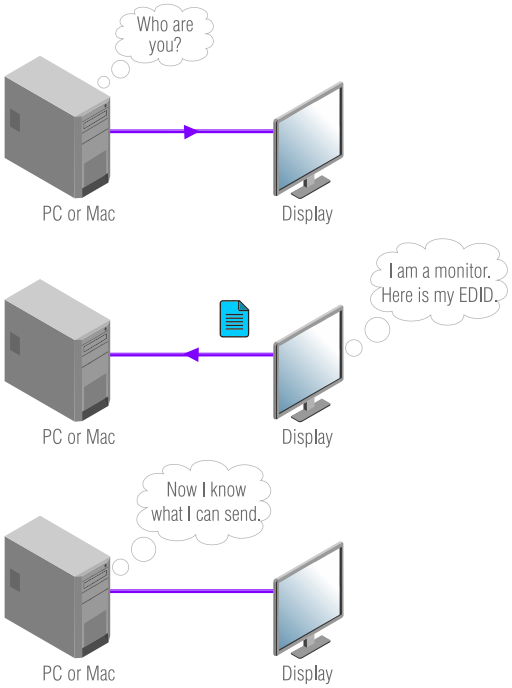


Figure 3-1. EDID communication

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

3.1.2. Common problems related to EDID

Problem: „I have changed to a different EDID on UMX-TPS-TX140 to have a different resolution but nothing happens."

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

Problem: „I have a UMX-TPS-TX140 and I'm using a Lightware factory preset EDID. I would like to be able to choose from different resolutions, but my source allows only one resolution."

Solution: Most Lightware factory preset EDIDs allow only one resolution, forcing the sources to output only that particular signal. You need to select the Universal EDID that supports all common VESA resolutions, see the factory EDID list.

3.2. Advanced EDID management

Each DVI sink (e.g. monitors, projectors, plasma displays, and switcher inputs) must support the EDID data structure. Source BIOS and operating systems are likely to query the sink using DDC2B protocol to determine what pixel formats and interface are supported. DVI standard makes use of EDID data structure for the identification of 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 case of EDID readout failure or missing EDID, the source will not output DVI video signal.

The transmitters provide Lightware's Advanced EDID Management function that helps system integration. The transmitter's built-in memory stores and emulates pre-programmed factory EDIDs, user's EDID and the monitor's EDID that is connected to the receiver. The transmitter stores the EDID of the attached monitor or projector in a non-volatile memory. This way the EDID from a monitor is available when the monitor is unplugged, or switched off.

The EDID emulated on the HDMI / DVI / DP / VGA input can be copied from the transmitter's memory (static EDID emulation), or from the last attached monitor's memory (dynamic EDID emulation). For example, the transmitter can be set up to emulate a device, which is connected to the receiver's DVI output. In this case, the EDID is automatically changed, if the monitor is replaced with another display device (as long as it has a valid EDID).

Advanced EDID management can be controlled via Lightware Device Controller.

Info: The user is not required to disconnect the HDMI / DVI / DP cable to change an EDID as opposed to other manufacturer's products. EDID can be changed even if source is connected to the input and powered ON.

Info: When EDID has been changed, the transmitter toggles the HOTPLUG signal for 2 seconds. Some sources do not observe this signal, so in this case the change is not recognized by the source. In such cases, the source device must be restarted or powered OFF and ON again.

3.3. HDCP management

Lightware Visual Engineering is a legal HDCP adopter. Several functions have been developed which help to solve HDCP related problems. Complex AV systems often have both HDCP and non-HDCP components. UMX-TPS-TX extenders allow to transmit 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 be shown.

3.3.1. 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 a HDCP capable device (e.g. an extender-pair) 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 always send HDCP encrypted signals if the receiver device (display, matrix router, etc.) reports HDCP compliancy. However, HDCP encryption is not required all the time e.g. computer desktop image, certain laptops still do that.

To avoid unnecessary HDCP encryption, Lightware introduced the HDCP enabling/disabling function: the HDCP capability can be disabled on the extenders. If HDCP is disabled, the connected source will detect that the sink is not HDCP capable, and turn off authentication.

3.3.2. Real life examples

HDCP-compliant sink

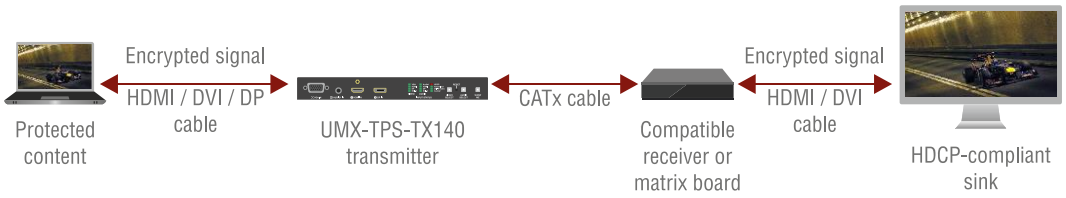


Figure 3-2. HDCP-compliant sink

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

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

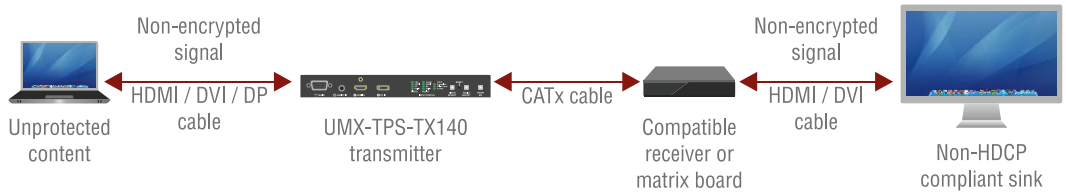


Figure 3-3. Non-HDCP compliant sink displaying unprotected content

Non-HDCP compliant sink is connected to the receiver. 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 transmitter, 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.

Non-HDCP-compliant sink (HDMI/DVI) 2.

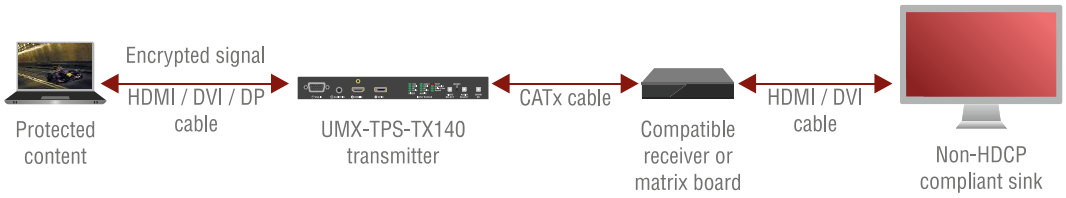


Figure 3-4. Non-HDCP compliant sink and protected content

The layout is the same as in the previous case: non-HDCP compliant display device is connected to the receiver but the source would send protected content with encryption. If HDCP is enabled on the input port of the transmitter, the source will send encrypted signal. The sink is not HDCP-compliant, thus it will not display the video signal (but blank/red/muted/etc. screen). If HDCP is disabled on the input port of the transmitter, the source will not send the signal to the transmitter. The solution is to replace the display device to a HDCP-capable one.

4. Installation

4.1. Mounting (UMX-TPS)

To mount the transmitter Lightware supplies optional accessories for different usage. There are two kinds of mounting kits with similar fixing method. UMX-TPS-TX devices have two mounting holes with inner thread on the bottom side; see the bottom view in section 11.2 on page 121. Fasten the device by the screws enclosed to the accessory.

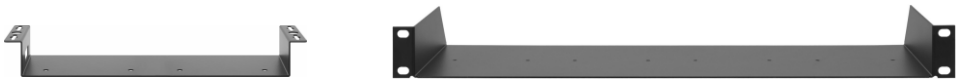


Figure 4-1. Under-desk double mounting kit and 1U high Rack shelf

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

Info: UMX-TPS-TX transmitters are half-rack sized.

4.2. Remote powering (PoE)

Remote powering of the transmitters was designed from a new approach as the devices support PoE (Power over Ethernet) feature. The transmitter can be powered remotely through TPS connector by using an external power injector module anywhere on the transmission lane. The transmitter is compatible with IEEE 802.3af standard and able to work as a Powered Device (PD) but cannot be used as a Power Sourcing Equipment (PSE).

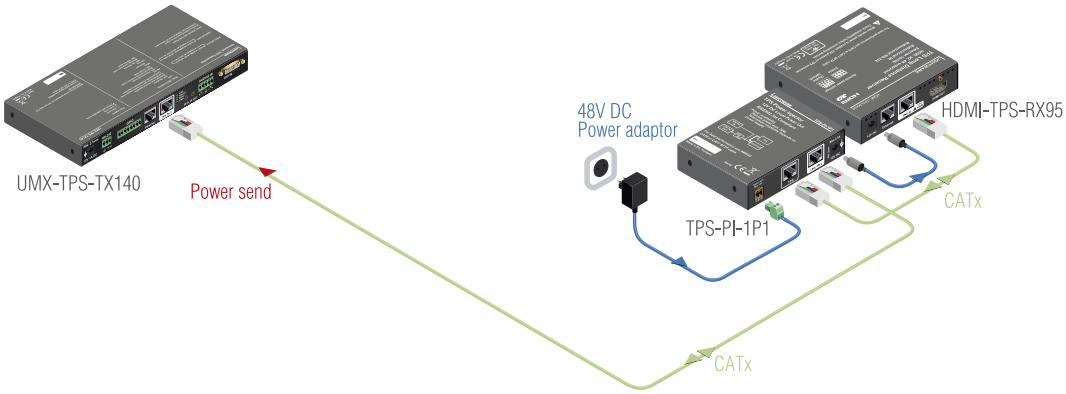


Figure 4-2. TPS-PI-1P1 is able to supply the whole system

Important! (WP-)UMX-TPS transmitters can receive the remote power only via their TPS output port. Using Lightware's remote power injector (TPS-PI-1P1) is highly recommended.

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

4.3. Connecting steps – using local PSU

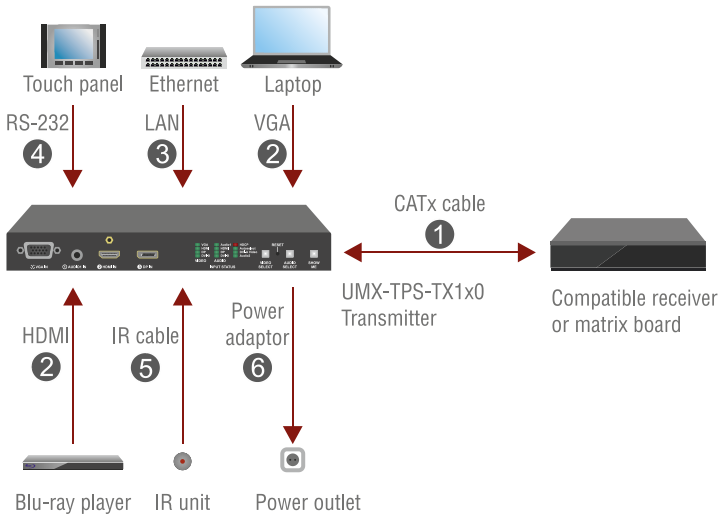


Figure 4-3. UMX-TPS-TX1x0 – Powered by a local adaptor

Step 1. Connect the transmitter and the receiver by a CATx cable via the TPS connectors.

Step 2. Connect the desired video and audio source(s) to the input port(s) of the transmitter.

Step 3. Optionally connect the transmitter to a Local Area Network (LAN) in order to control the device. More information about establishing the connection can be found in section 6.4 on page 44.

Step 4. Optionally connect a serial device to the transmitter's RS-232 port.

Step 5. Optionally for Infra-Red extension:

- Connect the IR emitter to the IR OUT port of the transmitter.
- Connect the IR detector to the IR IN port of the transmitter.

Step 6. Connect the power cord of the supplied adaptor to the transmitter or use Lightware's rack mountable power supply unit.

Step 7. Power on the devices.

Info: When both local adaptor and remote power injector are connected to UMX-TPS-TX1x0, the power injector will be used as a power source.

4.4. Connecting steps – using power injector (TPS-PI-1P1)

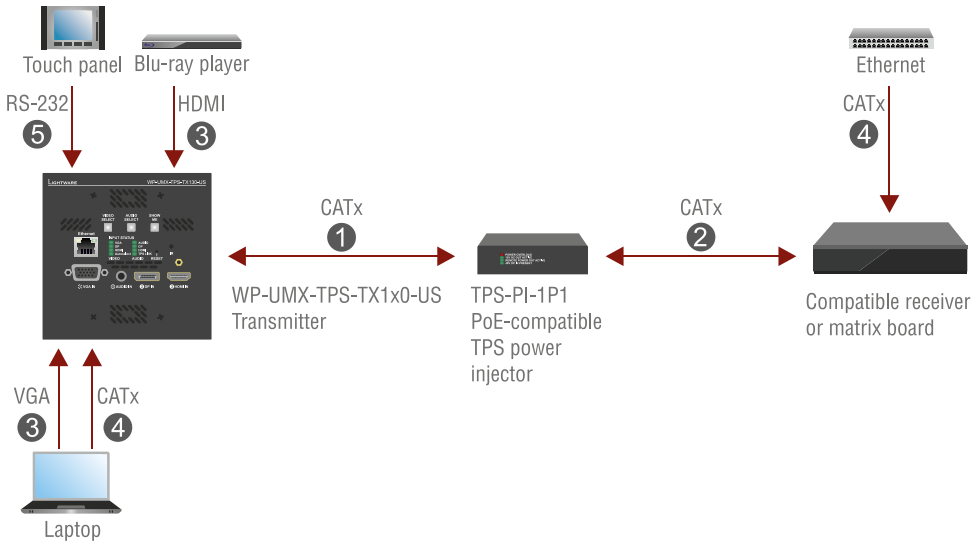


Figure 4-4. WP-UMX-TPS-TX130-US – Powered remotely

Step 1. Connect the "TPS OUT+PoE" port of the transmitter to the "TPS+PoE" output port of the TPS-PI-1P1 by a CATx cable.

Step 2. Connect the receiver (or the Matrix input board) to the power injector by a CATx cable via the TPS connector.

Step 3. Connect the desired video and audio source(s) to the input connector(s) of the transmitter.

Step 4. Optionally connect the transmitter to a Local Area Network (LAN) in order to control the device. More information about establishing the connection can be found in section 6.4 on page 44.

Step 5. Optionally connect a serial device to the transmitter's RS-232 port.

Step 6. Power on the devices.

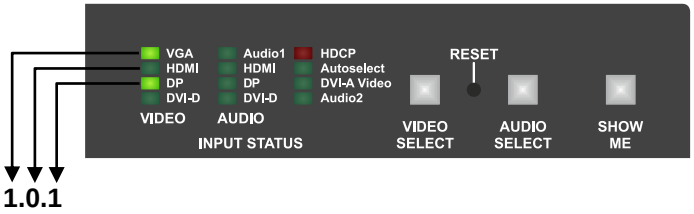
Info: When both local adaptor and remote power injector are connected to the wall plate transmitter, the local adaptor will be used as a power source. When the adaptor is disconnected from the wall plate, the device reboots and the remote power will be used.

4.5. Firmware indication

After being powered on, the transmitter lights up all LEDs, then displays its firmware version using three LEDs on the front panel: the upper three in the left column. The top LED means the first number of the firmware version – actually this is the main version. The second and the third LEDs from the top indicate the second and the third numbers of the firmware version which mean the subversions.

Example (UMX-TPS)

Below figure shows an UMX-TPS-TX140 with firmware version 1.0.1.

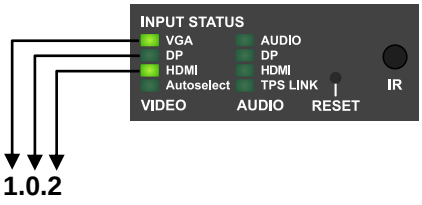


The process after the device is switched on or rebooted is the following:

All the LEDs are lit → VGA, HDMI and DP video LEDS are off for 1 sec → VGA LED blinks once the first number (1) → HDMI LED stays dark showing the second number (0) → DP LED blinks once showing the third number (1) → Front panel LEDs are off → Last state of the device is restored and displayed on the LEDs.

Example (WP-UMX-TPS)

Below figure shows a WP-UMX-TPS-TX130-US with firmware version 1.0.2.



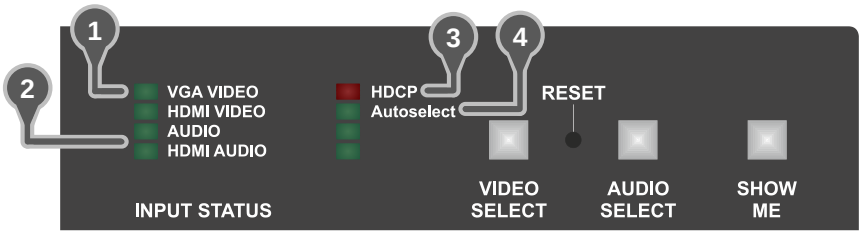
The process after the device is switched on or rebooted is the following:

Autoselect LED blinks twice → All the LEDs are lit → VGA, DP and HDMI video LEDS are off for 1 sec → VGA LED blinks once the first number (1) → DP LED stays dark showing the second number (0) → HDMI LED blinks twice showing the third number (2) → Front panel LEDs are off → Last state of the device is restored and displayed on the LEDs.

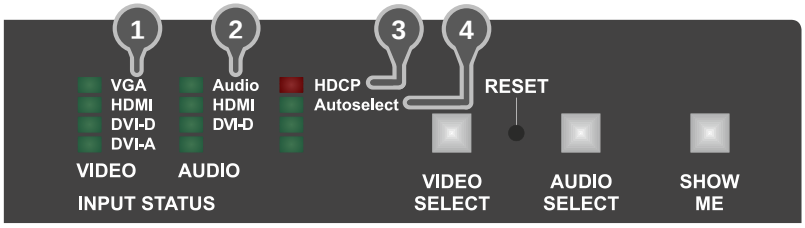
5. Front panel operations

5.1. Front panel LEDs

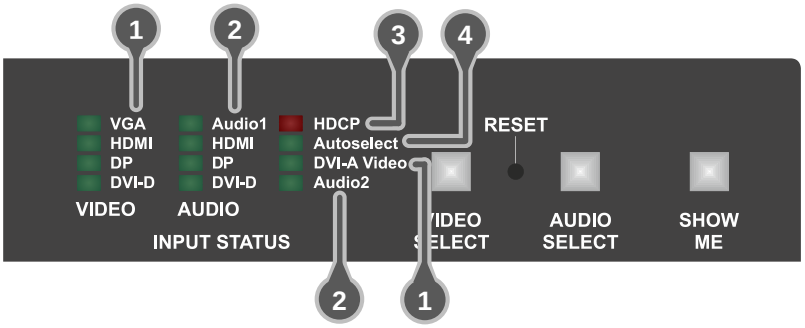
UMX-TPS-TX120



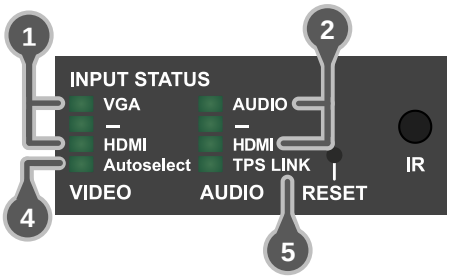
UMX-TPS-TX130



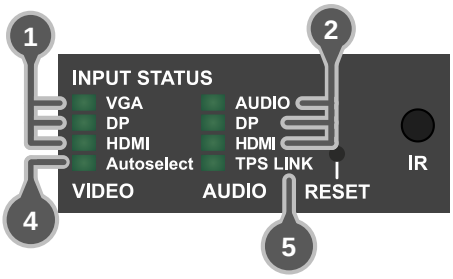
UMX-TPS-TX140



WP-UMX-TPS-TX120-US



WP-UMX-TPS-TX130-US



1 Video sources

dark:	video source is not selected
blinks:	video source is selected but not active
lights:	video source is selected and the port is active

Info: When Autoselect is enabled and video signal is not present at all, video LEDs blink.

Info: A port is active if there is a valid signal on it.

2 Audio sources

dark: audio source is not selected
blinks: (slow): the audio source is selected but not active, regardless of the output mode
(fast): analog audio is selected to a 4K-resolution video, but in this case the original audio is transmitted
lights: (with short pause): audio source is selected, the port is active but audio is not embedded to the video stream (the output mode is DVI).
(continuously): audio source is selected, active and the audio is embedded to the output video stream.

Info: If 4K video is selected to the output, analog audio cannot be embedded to the video stream due to the capabilities of the video IC, thus the original audio stream is transmitted.

3 HDCP

dark: video output signal is not encrypted with HDCP
lights: video output signal is encrypted with HDCP

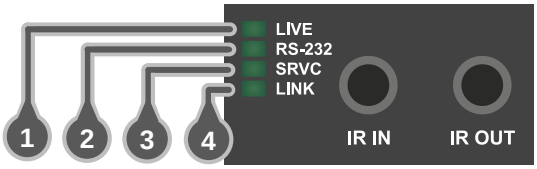
4 AUTOSELECT

dark: autoselect function is OFF
blinks: searching for signal (the video LEDs also blink)
lights: active video signal was found (the selected video LED also lights)

5 TPS LINK (WP-UMX-TPS)

dark: no TPS link between the transmitter and the receiver
blinks: (slow): low power mode is active
(fast): Ethernet fallback mode is active
lights: TPS link is established, HDBaseT or Long Reach mode is active

5.2. Rear panel LEDs (UMX-TPS)



1 LIVE

dark: device is not powered
blinks: (slow): device is powered and operational
(fast): device is in bootload mode
lights: device is powered but no operation

2 RS-232

dark: RS-232 ports (Local and Link) are in Pass-through mode
blinks: command injection mode is active
lights: RS-232 ports (Local and Link) are in Control mode

3 SRVC

lights: Testpattern is the selected and active input source

4 LINK

dark: no TPS link between the transmitter and the receiver
blinks: (slow): low power mode is active
(fast): Ethernet fallback mode is active
lights: TPS link is established, HDBaseT or Long Reach mode is active

Info: See more information about TPS link modes in section 6.6.6 on page 49.

5.3. Input port selection

The transmitters accept many video and audio input signals depending on the model's capabilities. The audio/video input can be selected by any of the following ways:

- Pressing the Audio select / Video select button,
- Using the Autoselect function,
- Using Lightware Device Controller,
- Sending LW2 or LW3 protocol command.

The transmitter can receive LW2 or LW3 command through Ethernet or RS-232 interface, which can be either local or remote. It means that the input selection can also be controlled remotely from a TPS receiver's RS-232 or Ethernet port.

Only one video and audio can be selected to transmit; below figure shows the block diagram of input/output selection.

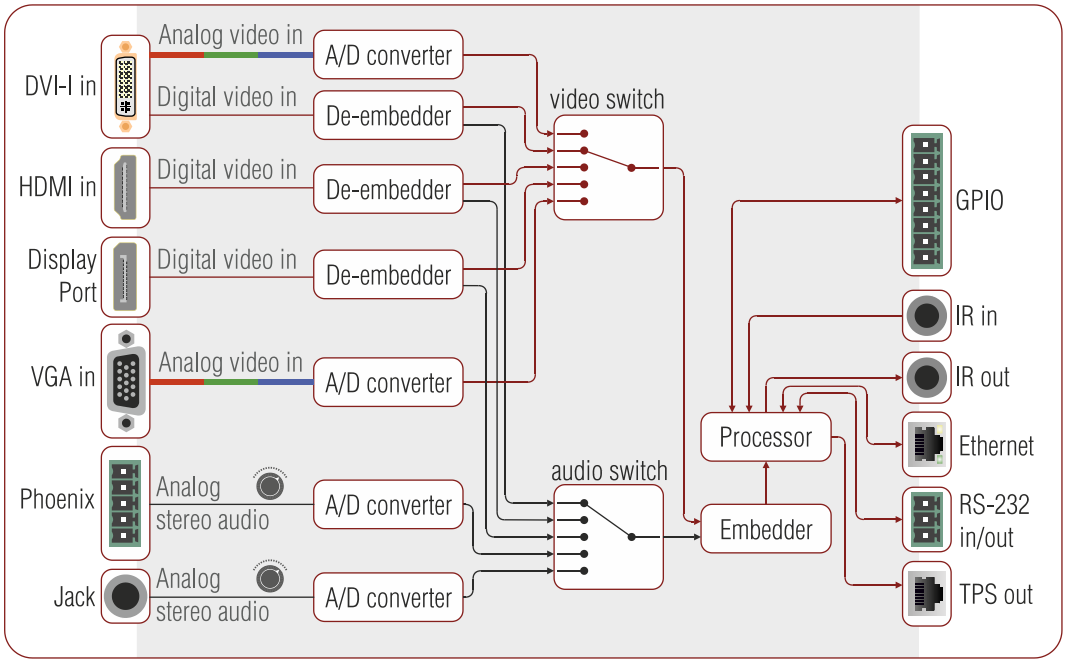


Figure 5-1. Input port selection – summary of UMX-TPS transmitters

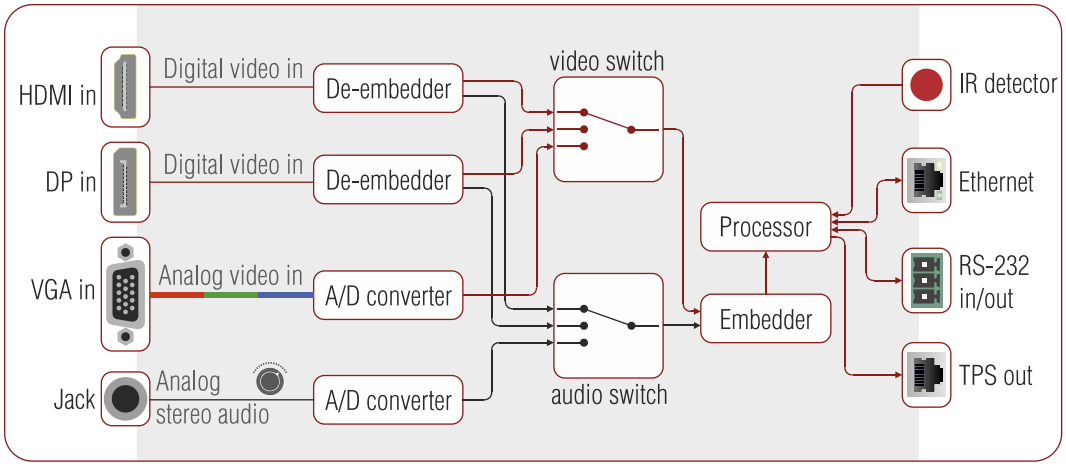


Figure 5-2. Input port selection – summary of WP-UMX-TPS transmitters

5.3.1. Direct selection (video input port)

Desired video input can be selected by the Video select button from front panel. The selection order of the inputs depend on the model as follows:

UMX-TPS-TX120	VGA → HDMI → Autoselect
UMX-TPS-TX130	VGA → HDMI → DVI-D → DVI-A → Autoselect
UMX-TPS-TX140	VGA → HDMI → DP → DVI-D → DVI-A → Autoselect
WP-UMX-TPS-TX120-US	VGA → HDMI → Autoselect
WP-UMX-TPS-TX130-US	VGA → DP → HDMI → Autoselect

5.3.2. Audio embedding – allowed connections

Selected audio signal can be embedded to an input video signal; following table contains the allowed connections:

		Audio source				
		HDMI	DP	DVI-D	Audio (Audio 1)	Audio2
Video source	HDMI	✓	-	-	✓	✓
	DP	-	✓	-	✓	✓
	VGA	-	-	-	✓	✓
	DVI-D	-	-	✓	✓	✓
	DVI-A	-	-	-	✓	✓

Figure 5-3. Cross audio-embedding support

Info: If 4K video is selected to the output, analog audio cannot be embedded to the video stream due to the capabilities of the video IC, thus the original audio stream will be transmitted.

5.3.3. Autoselect – First detect mode

Meaning: Selected input port is switched to the output while it has active signal.

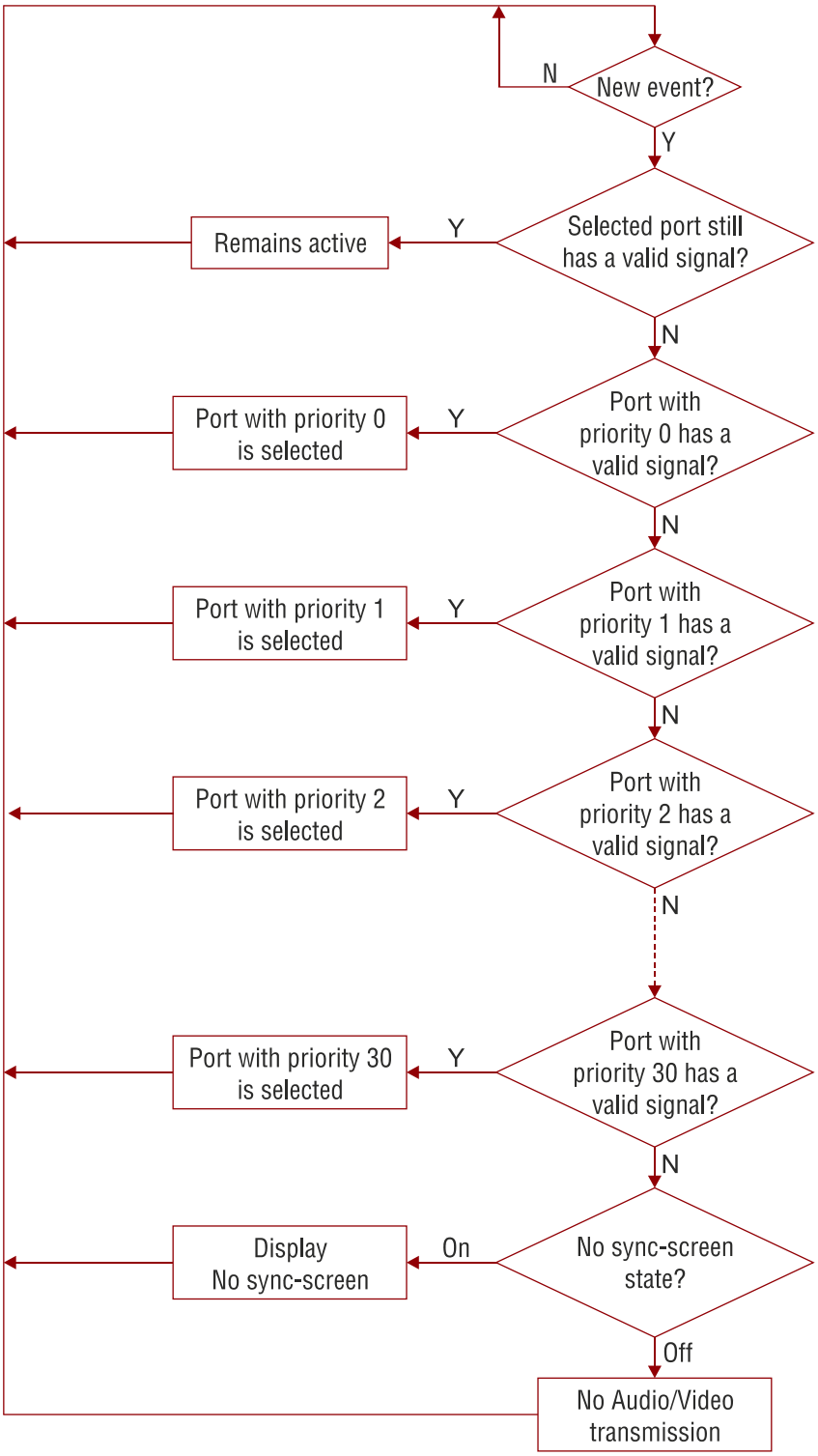


Figure 5-4. Autoselect – First detect mode

Info: For analog audio inputs the signal detection is handled on a different way. If the 3.5 mm jack is connected to Audio/Audio 1, the port is handled as it has an active signal; while Audio 2 (Phoenix) is always handled as it has an active signal.

Example (Video input ports on a UMX-TPS-TX140)

The priority values have to be assigned to each input port which are desired to be used. The followings priority settings will be used during the explanation of this mode:

Priority	0	1	2	3	31
Input port	P3 DP	P2 HDMI	P4 DVI-D	P1 VGA	P5 DVI-A

The port priority parameter can be set from 0 to 31. If the priority of a port is set to 31, the port will not be on the priority list and will be skipped. In this case lowest priority (31) is assigned to the DVI-A input thus it cannot be selected.

The priority list is checked from 0 to 30. After an event the device always checks the selected port. If there is a valid signal on it, the port remains selected. If there is no valid signal on the port the device checks the port with priority 0, in this case P3 (DP). If there is a valid signal on that port, it will be selected. If there is no valid signal on that port the device checks the port with priority 1, P2 (HDMI). If there is a valid signal on that port, it will be selected. If there is no valid signal on that port the device checks the port with priority 2, P4 (DVI-D). If there is a valid signal on that port, it will be selected. If there is no valid signal on that port the device checks the port with priority 3, P1 (VGA). If there is a valid signal on that port, it will be selected. If there is no valid signal on any of the checked input ports, the No sync-screen state will be checked; if the state is Off, there will be no Audio/Video transmission, otherwise No sync-screen is displayed.

Autoselect priority and crosspoint settings can be changed via the LDC surface, see section 6.6.6 on page 49, or by protocol commands.

Special features

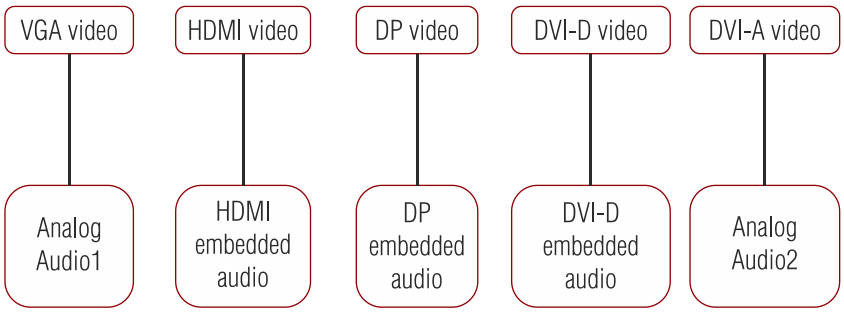
If more than one input port is active (there is valid signal on the input port) when the device is powered on, the priority order will be used to select the input port. The same priority number can be set to different input ports. In this case the input port with the lowest port number will have the highest priority among them. E.g. setting the priority of P2 (HDMI) and P3 (DP) to "0", the HDMI input port will have higher priority since P2 is lower than P3.

5.3.4. Autoselect – Last detect mode

This mode was introduced in Firmware 1.0.1. When the autoselect setting is enabled in this mode, always the last attached input is the active one. If a user connects a signal to any of the input ports, it becomes the transmitted input automatically.

5.3.5. Autoselect – Static mode (available only at Audio crosspoint)

In this mode all audio inputs are assigned to the video inputs statically:



Info: In case of UMX-TPS-TX130 the Analog audio input is assigned to the DVI-A video input.

5.3.6. Autoselect – Priority detect mode

Meaning: The highest priority active input will be selected to transmit.

Info: An input port is active if there is a valid signal on it.

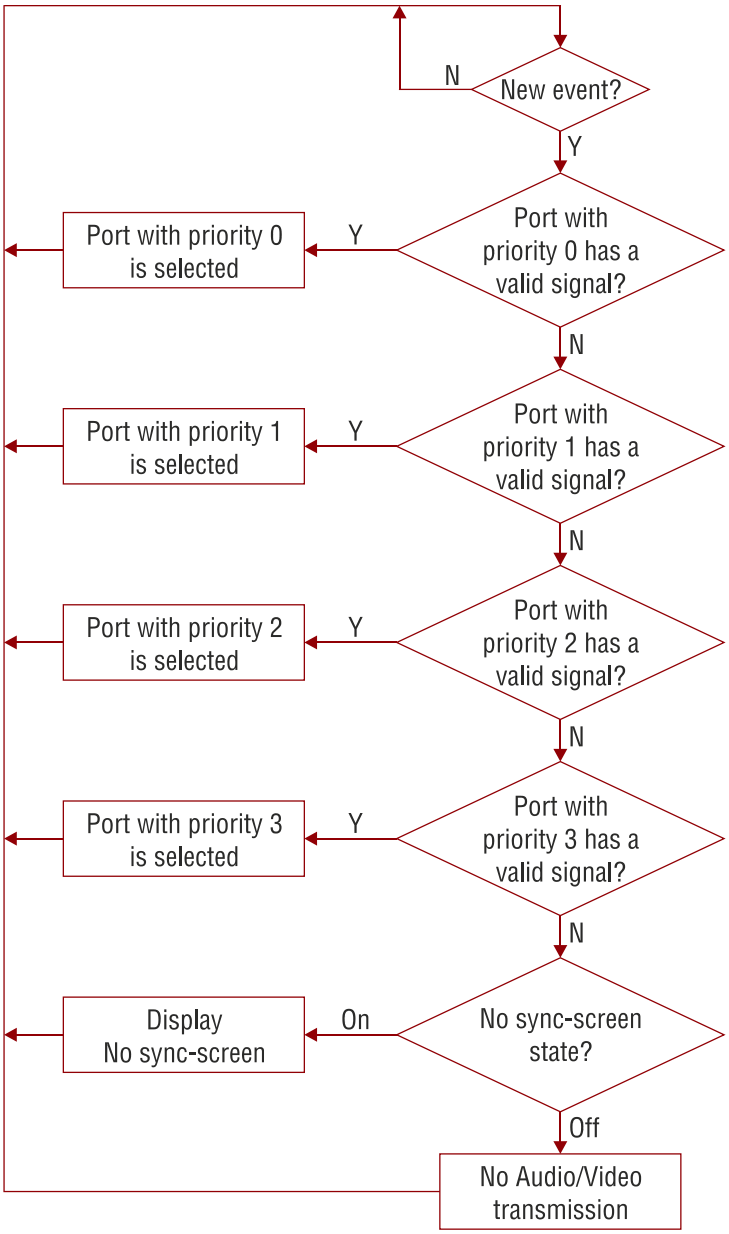


Figure 5-5. Autoselect – Priority detect mode

Info: For analog audio inputs the signal detection is handled on a different way. If the 3.5 mm jack is connected to Audio/Audio 1, the port is handled as it has an active signal; while Audio 2 (Phoenix) is always handled as it has an active signal.

Example (video input ports on a UMX-TPS-TX140)

The priority values have to be assigned to each input port which are desired to use. The followings priority settings will be used during the explanation of this mode:

Priority	0	1	2	3	4
Input port	P3 DP	P2 HDMI	P4 DVI-D	P1 VGA	P5 DVI-A

After an event the device always checks the port with the highest priority, P3 (DP). If there is a valid signal on it, P3 will be selected. If there is no valid signal on DP input port the device checks the following port with priority 1, P2 (HDMI). If there is a valid signal on it, P2 will be selected. If there is no valid signal on HDMI input port the device checks the following port with priority 2, P4 (DVI-D). If there is a valid signal on it, P4 will be selected. If there is no valid signal on DVI-D input port the device checks the following port with priority 3, P1 (VGA). If there is a valid signal on it, P1 will be selected. If there is no valid signal on any of the checked input ports, the No sync-screen state will be checked. if the state is Off, there will be no Audio/Video transmission, otherwise No Sync-screen will be displayed.

Port priority settings

Autoselect priority settings can be changed via the LDC surface, see section 6.6.6 on page 49, or by protocol commands.

Special features

The same priority number can be set to different ports. In this case the input port with the lowest port number will have the highest priority among them. E.g. setting the priority of P2 (HDMI) and P3 (DP) to "0", the HDMI input port will have higher priority since P2 is lower than P3. Ports can be skipped from the priority list by giving the lowest value: priority 31.

5.4. IR interface

IR receiver can sense IR light (e.g. emitted by a remote controller) and send electrical signals to the IR transmitter. The IR transmitter unit processes the electrical signals and emits IR light toward the controlled device (e.g. projector). IR OUT receptacle accepts only the IR transmitter and IR IN receptacle accepts only the IR receiver. IR accessories are not interchangeable.

IR signal from the IR input is transmitted to the receiver or input board and vica versa.

Info: Direct line of sight is required between IR transmitter and the controlled device (e.g. Blu-Ray or DVD player) and the same is valid for the IR receiver and the controller device (e.g. remote controller).

5.5. General purpose input/output ports (UMX-TPS-TX130 and TX140)

Certain models have 7 GPIO pins, which operate at TTL digital signal levels and can be controlled by both LDC and LW2 / LW3 protocol commands.

- Output pin state can be set with specific command.
- Input pin state can be queried, and a notification is sent from the device, if the state is changed.

As a special function, the GPIO pins would act the same way as video select, audio select and show me buttons. Using the GPIO pins in conjunction with the Event manager gives many functions. See more details in section 6.9 on page 55.

Info: GPIO control is available in Firmware v1.0.1 and above.

5.6. Special functions

5.6.1. Control lock

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

5.6.2. Reset to factory default settings

If factory default values have to be restored, do the following steps:

Step 1. Make sure the device is powered on and operational (control is not locked).

Step 2. Press and keep pressed the Show me button for 10 seconds.

Step 3. After 5 seconds front panel LEDs start blinking but keep on pressing the button.

Step 4. After 10 seconds the blinking gets faster; release the button and press it 3 times again quickly (within 3 seconds).

Step 5. The LEDs get dark, the device restores the factory default settings and reboots.

Factory default settings are listed in section 11.6 on page 125.

5.6.3. Enable DHCP IP address

The device gets a fix 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 (control is not locked).

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 and the device reboots.

5.6.4. Entering bootload mode

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

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. If the device is switched to bootload mode:

a) The LIVE LED is blinking quickly on UMX-TPS transmitters.

b) The AUTOSELECT LED is blinking quickly on WP-UMX-TPS transmitters.

The other LEDs are off.

Info: Device can be switched to normal operation mode by resetting or switching it off and on again.

5.7. RS-232 interface

The RS-232 interface supports three modes: Pass-through mode, Control mode and Command injection mode. The RS-232 mode can be set by protocol commands or via the Lightware Device Controller, see the section 6.8.1 on page 54.

Local and link lines

The transmitters have two lines for RS-232 serial communication:

- Local: serial line between the CPU and the Phoenix connector,
- Link: serial line between the CPU and the TPS interface.

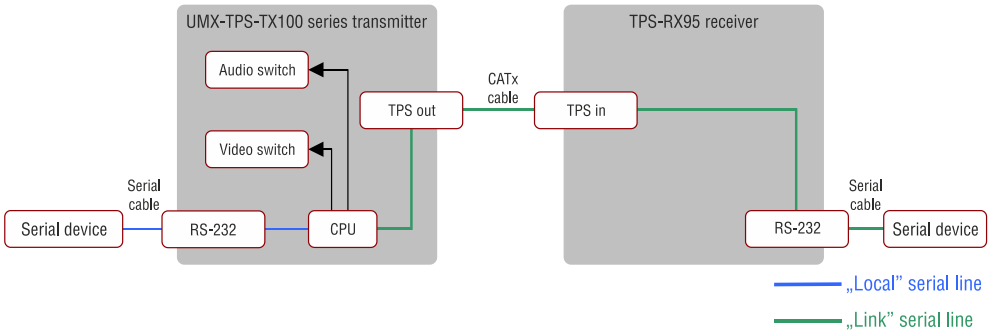


Figure 5-6. Local and link serial lines

Both lines are connected to the microcontroller, so these can be configured separately (e.g. the baud rate can be different; the microcontroller does the conversion automatically between the two ports).

5.7.1. Control mode

In Control mode the transmitter's CPU can receive commands and send responses to/from its own serial port or to/from the serial port on the receiver through the CATx (TPS) cable. The incoming data from both sides is processed and interpreted as LW2 or LW3 protocol commands. Selecting the control protocol (LW2 or LW3) on the RS-232 interface can be done either by using Lightware Device Controller or sending LW2/LW3 protocol commands. The interface can be set for the Local and for the Link RS-232 line independently from each other.

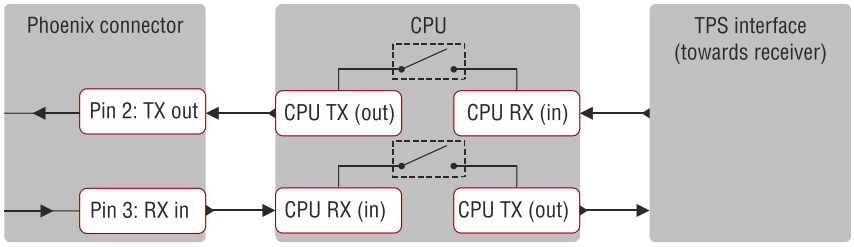
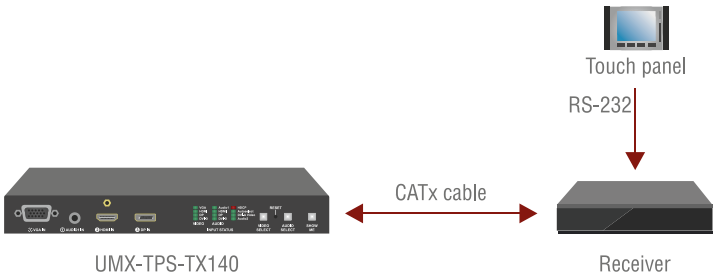


Figure 5-7. Control mode

Example



The transmitter is connected to a receiver. A touch panel is connected to the RS-232 port of the receiver and it sends commands to the transmitter; this is called ROT v2 (RS-232 over TPS). ROT only supports a few commands, which answer length is less than 50 Bytes.

5.7.2. Pass-through mode

In pass-through mode the incoming data from the local and link sides is passed through to the other side without processing it. The serial ports on the transmitter and on the receiver are linked together through the CATx (TPS) cable. This allows direct communication between a device connected to the receiver and a device connected to the transmitter.

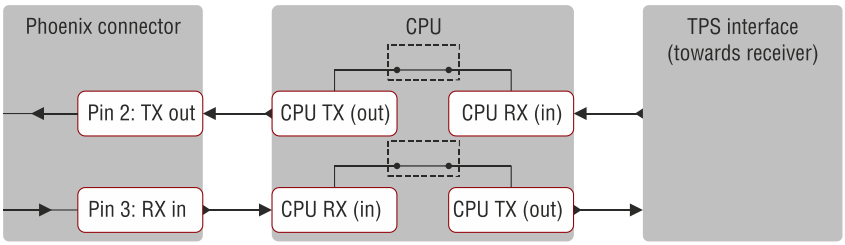
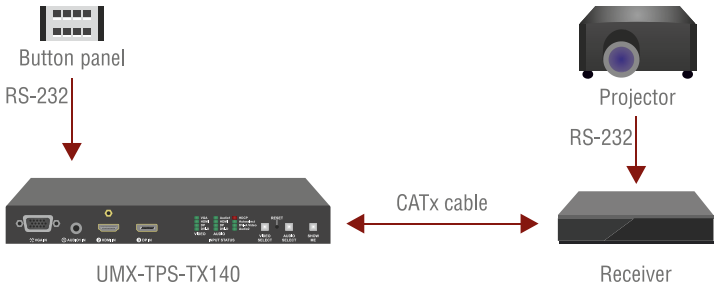


Figure 5-8. Pass-through mode

Example



The transmitter is connected to a receiver. A button panel is connected to the RS-232 port of the transmitter and a projector is connected to the RS-232 port of the receiver. The commands sent by the button panel are passed through the extenders to the projector. This layout allows to remote control the projector from a button panel.

5.7.3. Command injection mode

When the device is in RS-232 command injection mode, it works as an RS-232-Ethernet converter (bidirectional). There are two separate TCP/IP ports for this purpose, one for the link and one for the local side. On these ports the Ethernet packets are converted to RS-232 data and vica versa. The local and the link sides are not connected in this mode.

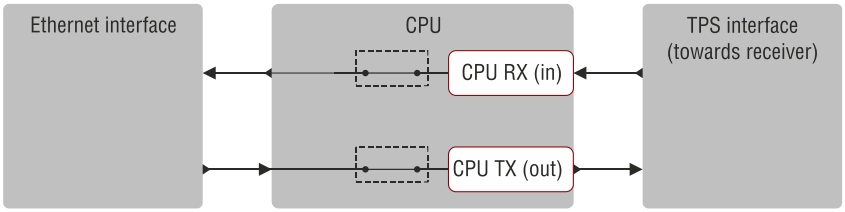
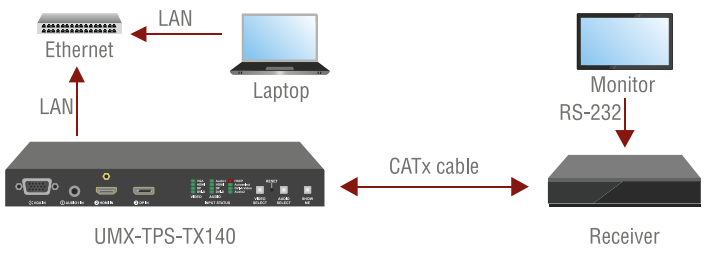


Figure 5-9. Command injection mode

Example



The transmitter is connected to a receiver. A monitor is connected to the receiver's RS-232 port. The transmitter and a computer are connected to same Ethernet. In command injection mode the computer can send commands to the monitor through the extenders, so this layout allows to remote control the monitor from a computer.

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

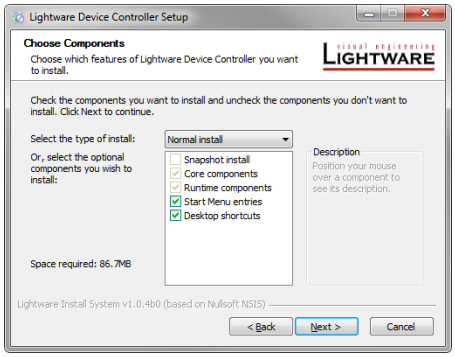
The device can be controlled by a computer through the Ethernet port using Lightware Device Controller. The software can be installed to a Windows PC or MAC OS X. The application and the User's manual can be downloaded from www.lightware.eu. The Windows and the Mac versions have the same look and functionality.

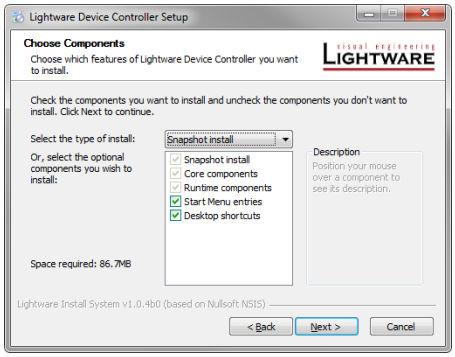
6.1. Steps of the installation in case of Windows OS

Step 1. Run the installer; if User Account Control appears click Yes.

Step 2. A welcome window opens. Click Next.

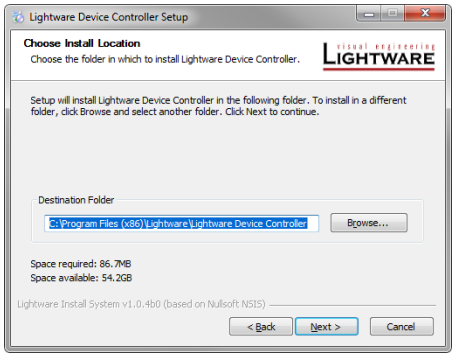
Step 3. Select the type of the installation: normal or snapshot install. Select the optional components then click Next. (Normal install is recommended.)



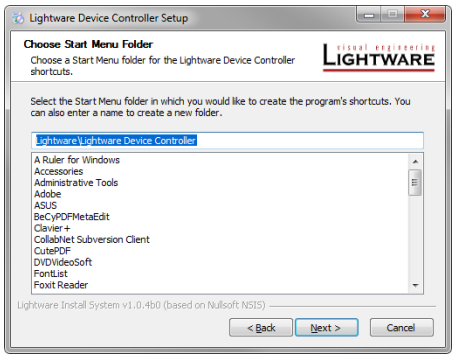


Normal install	Snapshot install
Available for Windows and MAC OS X	Available for Windows
The installer can update only this instance	Cannot be updated
Only one updateable instance can exist for all users	More than one different versions can be installed for all users
Does not contain the version in its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

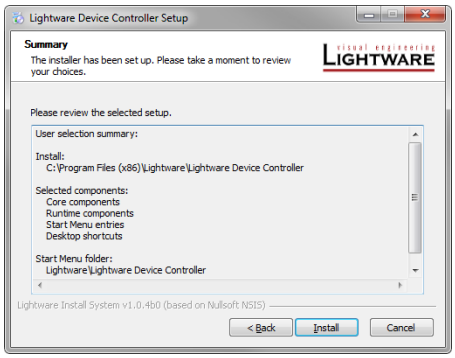
Step 4. Select the destination folder and click Next. (Default path is highly recommended.)



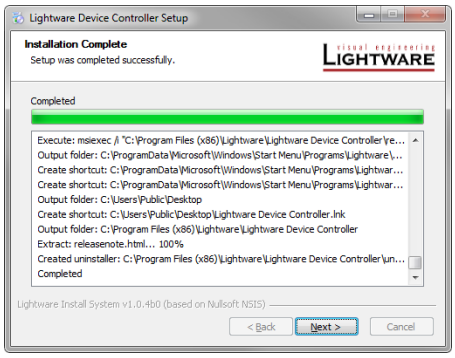
Step 5. Select the Start Menu Folder and click Next. (Using the default folder is highly recommended. If the Start menu entries was not checked in Step 3 this window will be skipped.)



Step 6. Verify the settings and if they are correct click Install. (If not, click Back and change the setting.)



Step 7. After the installation of the last component the Next button is activated. Click on it.



Step 8. If the installation is complete, click Finish. (Uncheck the box if you do not want to run the software immediately.)

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

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

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

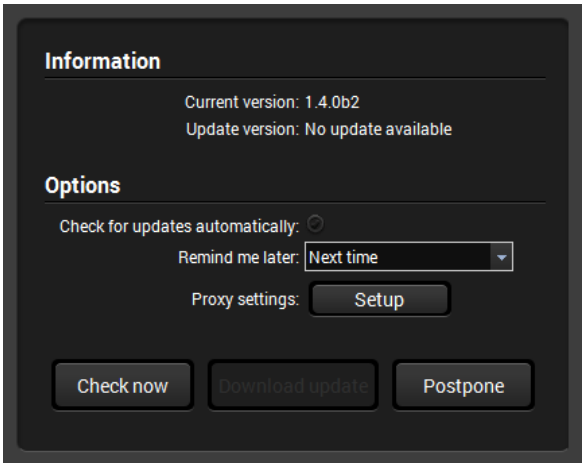
Step 2. Drag the LDC icon over the Applications icon to copy the program into the Applications folder. If you want to copy the LDC into another location just drag the icon over the desired folder.

Info: This type of the installer is equal with the Normal install in case of Windows. This is an updateable version with the same attributes.

6.3. LDC Upgrade

Step 1. Run the application.

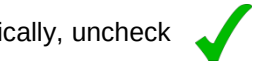
The Device Discovery window appears automatically and the software checks the available updates on Lightware's website and a new window pops up if a new update is found.



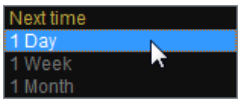
The current and the update version number can be seen in the top of the window and they are shown in this window even with the snapshot install.

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

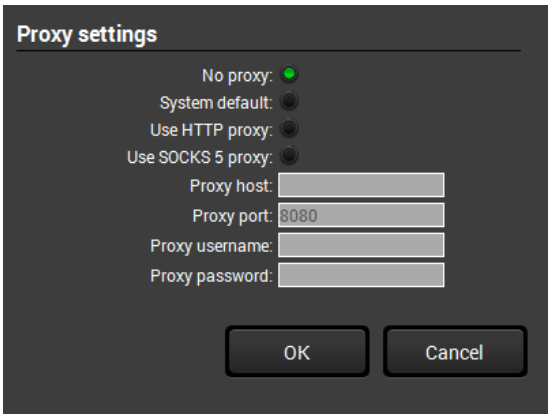
a) If you do not want to check for the updates automatically, uncheck the circle, which contains the green tick.



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



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



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

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

6.4. Establishing the connection

Step 1. Connect to the device by a computer directly or via Ethernet. Cable type does not matter, both patch and cross cable can be used.

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

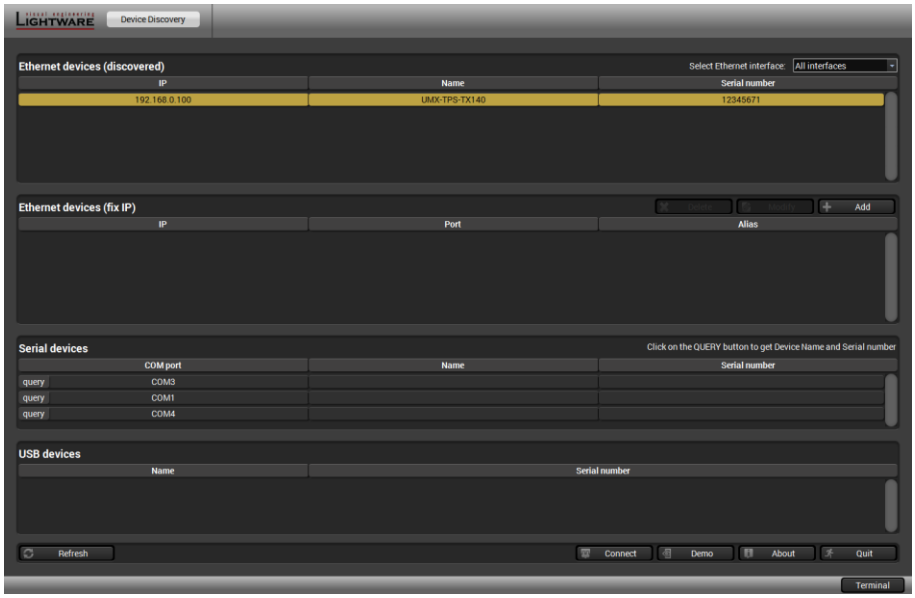


Figure 6-1. Ethernet connection in Device discovery window

Step 3. Select the desired device from the discovered devices click on the Connect button. If you do not see your device in the list, you can add it by clicking on the Add button and typing its IP address.

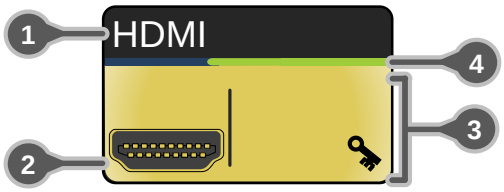
6.5. Crosspoint menu

When LDC finds the hardware, it determines the product type, and the LDC starts with the default page, showing the Crosspoint menu.

1	**Main menu**	The available menu items are displayed. The active one is showed with dark grey background color.
2	**Information ribbon**	The label shows the type of the connected device. 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 current crosspoint setting; if the port is switched to the output, the color of the tile is white, otherwise grey.
4	**Audio input ports**	Each tile represents an audio input port. The tile below the port shows current crosspoint setting; if the port is switched to the output, the color of the tile is white, otherwise grey. Dark grey means the audio port is not allowed to embed in the current video input port.
5	**Audio output (TPS)**	The audio output of the TPS output.
6	**Video output (TPS)**	The video output of the TPS output.
7	**Advanced view**	Displaying Advanced view page, showing the Terminal window and the protocol tree.
8	**Navigation buttons**	If the window is smaller than required, the ports may not fit in the available area. Thus the arrows on this button get activated and the ports can be scrolled. Clicking on the middle icon restores the original layout (window is arranged to the left top corner).
9	**Properties**	Toggling right panel display, showing the properties of selected port. The panel is also displayed when clicking on a port tile.

Port tiles

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



1. Port name
2. Port icon
3. State indicators
4. Signal present (green), not present (grey)

State indicators

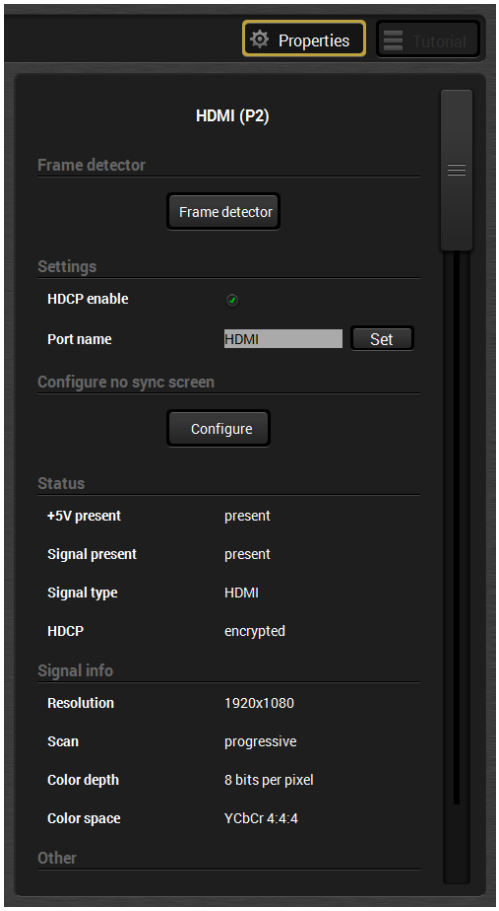
Following icons display different states of the port/signal:

Icon	Icon is not displayed	Icon is grey	Icon is black
	HDCP is not supported	Signal is not encrypted with HDCP	Signal is encrypted with HDCP
	-	Port is unmuted	Port is muted
	-	Port is unlocked	Port is locked
	-	Autoselect is disabled	Autoselect is enabled*

* Displayed only on TPS output; when Autoselect is enabled the icon is displayed in green.

6.6. Port properties and settings

Left click on Properties button to display the properties panel of selected port. Signal status information and the most important parameters are displayed on the panel. Special functions (e.g. frame detector, port naming) are also available on the panel. The look and the content is port-dependent.



Port name

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

The following characters are allowed when naming:

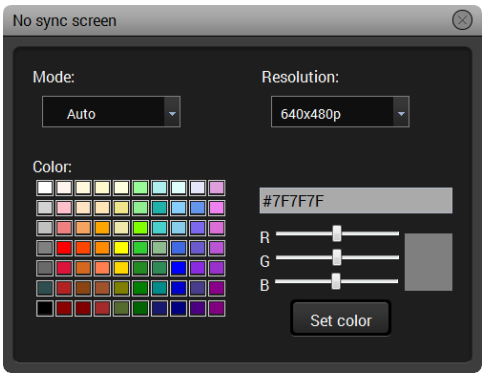
Letters (A-Z) and (a-z), hyphen (-), underscore (_), numbers (0-9) and dot (.).

HDCP setting

The HDCP compliancy can be enabled or disabled on the digital video input port. This feature can force the source to send non-encrypted signal if the encryption would not be necessary and the content allows it.

6.6.1. No sync screen

The port generates an image which can be displayed when there is no incoming signal on the port. Each port can have individual settings which can be set by clicking on the "Configure" button.



Mode: Auto – no sync screen signal is sent when there is no incoming signal

Always on – no sync screen signal is sent always, independently from the incoming signal

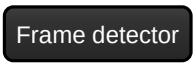
Always off – no signal is sent when there is no incoming signal

Resolution: Set the desired image resolution from the drop-down menu.

Color: Click on the desired color or use the sliders and press the Set color button to store.

6.6.2. Frame detector (on video input ports)

Input ports can show detailed information about the signal like blanking intervals and active video resolution. This feature is a good troubleshooter if compatibility problems occur during system installation. To access this function, open Properties panel of the input port on which the signal has to be checked. Click on Frame Detector button to show detailed timings.



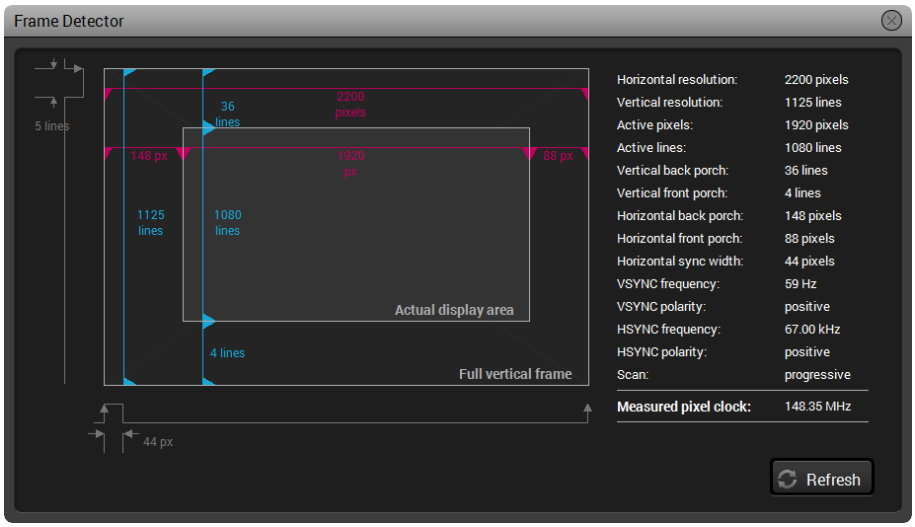


Figure 6-2. Frame detector window

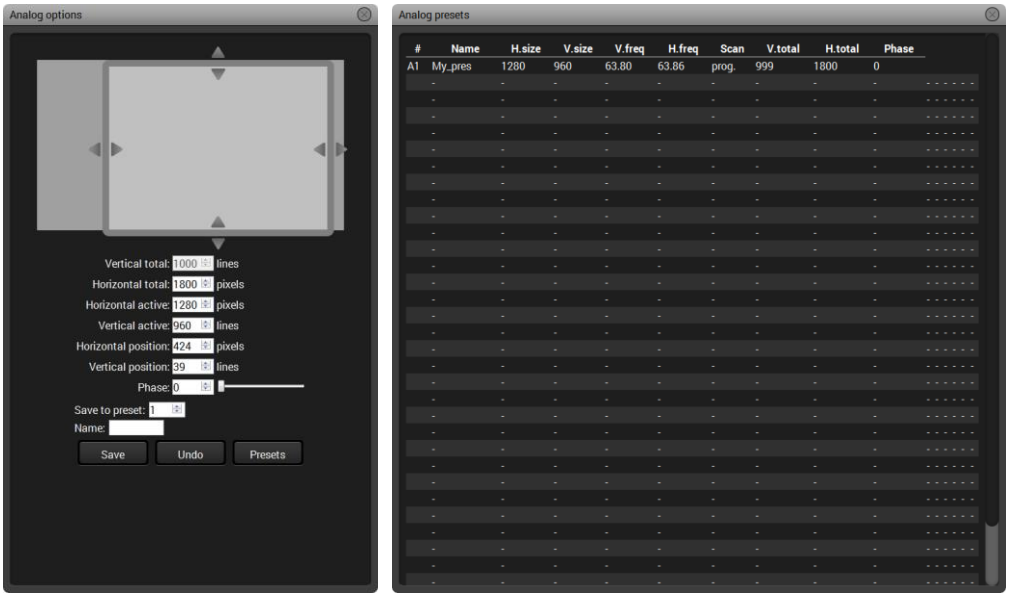
Lightware's frame detector function works like an input signal analyzer and makes possible to determine the exact video format that is sent by the source, thus helps to identify many problems. E.g. actual timing parameters may differ from the expected and this may cause some displays to drop the picture.

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

6.6.3. VGA and DVI-A video input port properties

Analog options

Analog video signals are digitized on the input. The timing parameters can be adjusted here if needed. Timing presets can be saved for each resolution separately.



Presets can be named and saved, nevertheless the preset list can be saved to a file and loaded at any time.

Settings

Besides the port name, the source mode can be set: Auto, RGB or YUV.

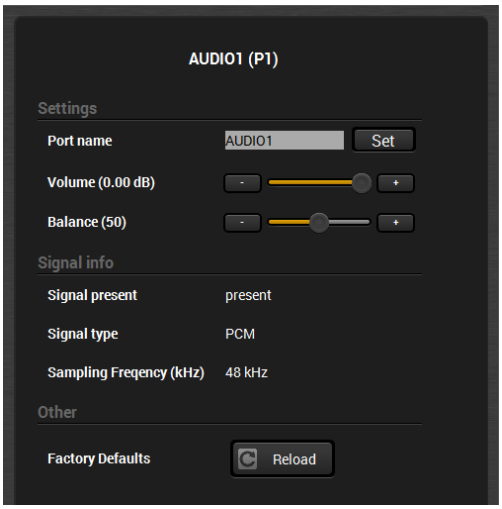
6.6.4. TESTPATTERN properties

The TESTPATTERN can also be selected as an input port, which is a solid image with user-defined color and resolution. The settings are the same as for “No sync screen”, see the section 6.6.1 on page 47.

6.6.5. Analog audio port properties (Audio, Audio1 and Audio 2)

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

- Volume:
  from 0 dB to -52 dB (step 0.25 dB), from -54 dB to -66 dB (step 2 dB); -69 dB; -72 dB; -78 dB (default is 0 dB)
- Balance:
  from 0 to 100, step 1 (default is 50 = center)



6.6.6. TPS output port properties and mode settings

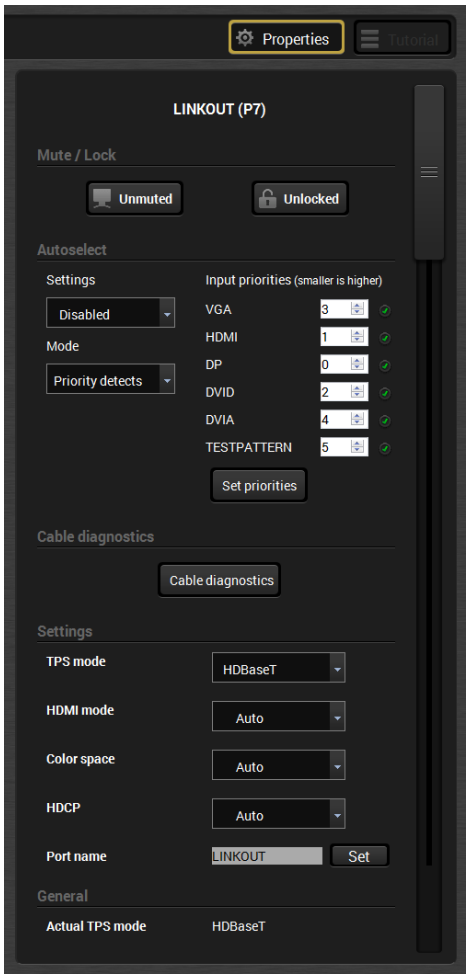
Muting/Locking

TPS output can be muted by clicking on the button Unmuted. If the output is muted, button text is Muted. When the port is muted, no signal is present on the output.

TPS output can be locked by clicking on the button Unlocked. If the output is locked, button text is Locked. If the port is locked, its mute state cannot be changed either by the button, or by loading a preset.

Autoselect

The autoselect feature can be set via the TPS OUT properties panel. The Autoselect section contains the following settings:



Settings

- Enabled: The Autoselect mode is ON.
- Disabled: The Autoselect mode is OFF.
- Priority detects: Priority detect mode is active (see section 5.3.6 on page 36).
- First detect: First detect mode is active (see section 5.3.3 on page 34).
- Last detected: Last detect mode is active (see section 5.3.4 on page 35).
- Static: Static mode is active (see section 5.3.5 on page 35). Available only at TPS Audio out.

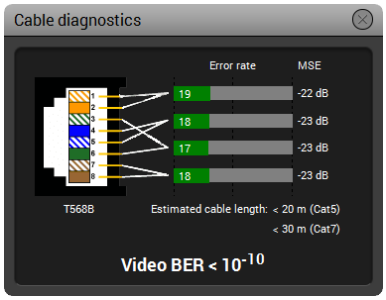
Always press the Set button after the modification to store the settings.

Input priorities

The available input ports are listed; each one has its own priority number (equal numbers are allowed). If you want to disable a port from the priority list, uncheck the setting next to the priority number and the priority number will be emptied and disabled. Smaller number means higher priority as usual. Priority 31 is the lowest priority, in this case the port will not be checked and will not be on the priority list.

Always press the Set priorities button after the modification to store the settings.

Cable diagnostics (only on TPS Video output port)



The estimated cable length and the quality of the link are measured periodically and the diagnostic window shows the values in real-time. If the green bars hit the first line in the middle they turn into red. It means the number of the errors – during the extension – is higher than the recommended one. The link might be alive but recovering of the received data is not guaranteed.

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

Info: The estimated length is valid for Cat5e AWG24 cables. Cat7 cable length is calculated from the measurement of Cat5e AWG24 cable.

Video Bit Error Ratio (only on TPS Video output port)

This feature works in conjunction with the TPS receiver's side and is about to show the average bit error numbers in the transmitted video signal. The value is displayed only if the installed firmware on the RX side supports this feature. Reference values:

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

Above displayed "Video BER < 10^{-10}" value means that in average there is 1 bad pixel after 10^{10} pixels, which means the number of the bit errors is about 1 pixel in every 15 minutes.

TPS settings (only on TPS Video output port)

Basic transmission parameters can be set on this panel as follows:

TPS mode

- Auto: The TPS mode is determined automatically
- HDBaseT: Ideal for high resolution signals up to 4K but with shorter cable
- Longreach: Ideal for big distances, but until 1080p@60Hz
- Only RS232: Only RS-232 communication is transmitted (**Low Power mode**)
- Only RS232 + Eth: Only RS-232 and Ethernet communication is transmitted (**Low power mode**)

Info: If Low power mode is active and the Ethernet connector is plugged/unplugged, minor temporary disturbance may arise in the transmission of RS-232 and/or IR signal.

Info: The allowed cable lengths and resolutions are listed in section 11.3 on page 122.

These settings refer to the transmitter. The TPS transmission mode between the transmitter and the receiver depends on the settings of both units. The table below details the system's state with regard to mode selection behavior for all possible combinations for both ends of the link:

		Mode selected on RX side				
		RS232	**RS232+Eth.**	**HDBaseT**	**Longreach**	**Auto**
Mode selected on TX side	**RS232**	RS232	RS232	RS232	RS232	RS232
	RS232+Eth.	RS232	RS232+Eth.	RS232+Eth.	RS232+Eth.	RS232+Eth.
	HDBaseT	RS232	RS232+Eth.	HDBaseT	RS232	HDBaseT
	Longreach	RS232	RS232+Eth.	RS232	Longreach	Longreach
	Auto	RS232	RS232+Eth.	HDBaseT	Longreach	Auto

Figure 6-3. TPS mode determination between transmitter and receiver

Info: When a standard Ethernet device is connected to the TPS connector for some reason, the transmitter is switched to Ethernet fallback mode automatically. TPS port is changed to work as an Ethernet port, but to operate the transmitter this way is not recommended.

When using automatic operation mode selection, the device uses built-in sensors to determine the mode of operation. If the transmitter and the receiver is in Auto mode, the source side is the initiator. It will negotiate each state transition with its sink side partner.

Info: If the sink is switched off or disconnected on receiver's side, the TPS link mode is changed to "RS232+Eth" mode – when the devices are set to Auto. In this case signal is not present on the output port of the transmitter.

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.

Settings

- HDMI mode: Auto / DVI / HDMI 24 bit / HDMI 30 bit / HDMI 36 bit
- Color space: Auto / RGB / YCbCr 4:4:4 / YCbCr 4:2:2
- HDCP: Auto / Always

6.7. EDID menu

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

Figure 6-4. EDID menu

Control buttons

Save	Exporting an EDID (save to a file)	>	Executing EDID emulation or copying (Transfer button)
Load	Importing an EDID (load from a file)	Clear selected	Deleting EDID (from user memory)
Info	Display EDID Summary window	Select All	Selecting all memory places in the right panel
Edit	Opening Advanced EDID Editor with the selected EDID	Unselect All	Selecting none of the memory places in the right panel
EEC	Opening Easy EDID Creator		

6.7.1. Sources and Destinations

The EDID memory consists of four parts:

Factory EDID list shows the pre-programmed EDIDs (F1-F119).

Dynamic EDID List shows the display device connected to the device's outputs. The unit stores the last display devices' EDID on either output, so there is an EDID shown even if there is no display device attached to the output of the transmitter at the moment.

User memory shows the memory locations (U1 – U14) which can be used by the user to save custom EDIDs.

Emulated EDID list shows the currently emulated EDID for the inputs. The source column displays the memory location that the current EDID was routed from.

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

There are two types of emulation: static and dynamic.

- **Static EDID emulation** happens, when an EDID from the Factory or User EDID list is selected. In this case the Emulated EDID will remain the same until the user emulates another EDID.
- **Dynamic EDID emulation** can be enabled by selecting D1 or D2 EDID memory. The attached monitor's EDID is copied to the input; if a new monitor is attached to the output, the emulated EDID changes automatically.

6.7.2. Changing emulated EDID

Step 1. Select the desired EDID list from one of the three sources by pressing its button.

Step 2. Select an EDID from the Source panel to emulate.

Step 3. Press Emulated button on the top of the Destination panel.

Step 4. Select desired port on the right panel (more than one ports can also be selected); the EDID(s) will be highlighted with yellow cursor.

Step 5. Press Transfer button to change the emulated EDID.

6.7.3. Learning an EDID

Info: The process is the same as changing the emulated EDID; the only difference is at 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).

6.7.4. Exporting an EDID

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

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

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

6.7.5. Importing an EDID

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

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

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

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

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

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

6.7.6. Deleting EDID(s)

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

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

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

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

6.7.7. EDID Summary window

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

Figure 6-5. EDID Summary

6.7.8. Editing an EDID

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

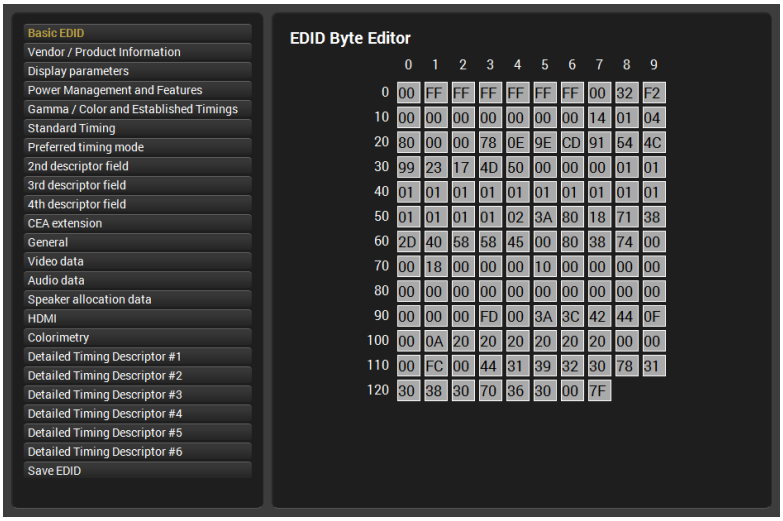


Figure 6-6. Advanced EDID Editor

6.8. Control menu

The menu gives the opportunity to setup those channels which can be used to connect or control third party devices.

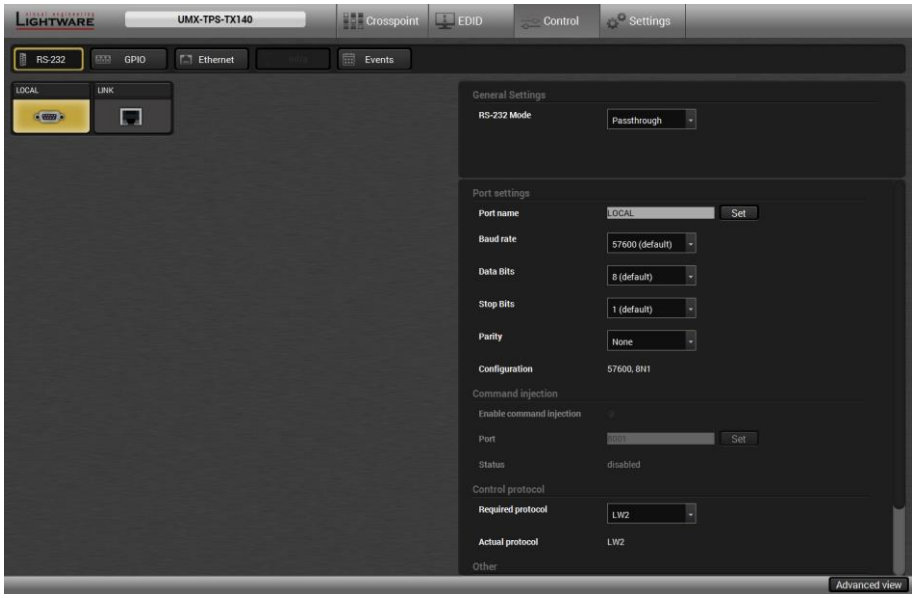
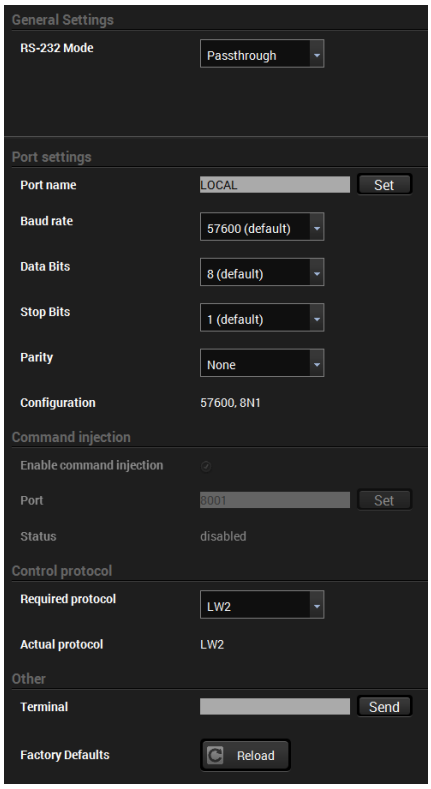


Figure 6-7. Control menu (RS-232 tab)

6.8.1. RS-232 tab

General Settings



There are three RS-232 working modes: Pass-through-, Control- and Command Injection modes. See more details in section 5.6 on page 38.

Port settings

Two ports are available:

- Local: Serial connection between the CPU and the 3-pole Phoenix connector
- Link: Serial connection between the CPU and the receiver unit (via TPS line)

The settings are the same but different parameters can be set for Local and Link ports.

Command injection

If the Command injection mode is selected, this section is activated and the port number can be set. Default value is 8001 (local), and 8002 (link).

Control protocol

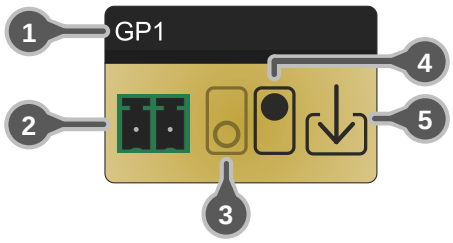
The active protocol can be set by the drop-down menu: LW2 or LW3 protocol.

Other

The terminal line can be used to send commands to the destination in pass-through mode.

6.8.2. GPIO tab (only on UMX-TPS-TX140)

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



1. GPIO pin name
2. GPIO port icon
3. Low level indicator*
4. High level indicator*
5. Pin direction: input (down arrow) or output (up arrow)

* The black colored symbol means the current setting.

6.8.3. Ethernet tab

Basic information is shown about the network communication.

6.9. Event manager

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

Basically the Event manager can be configured to detect LW3 CHANGE messages, and if the condition (the given change message) appears, the event will be fired. The device will perform an action (send out a preprogrammed LW3 SET or CALL message to itself). E.g. the desired setup is that after the input signal has been present on the VGA port, the level of GPIO1 pin is changed. The settings can be done via the LDC in the Control/Events tab, or by LW3 protocol commands, see section 8.10 on page 101.

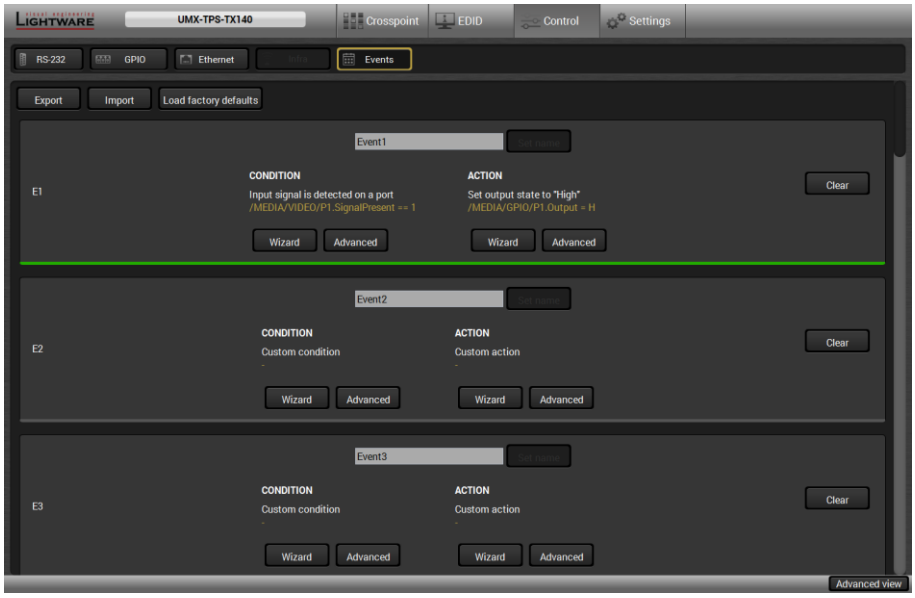
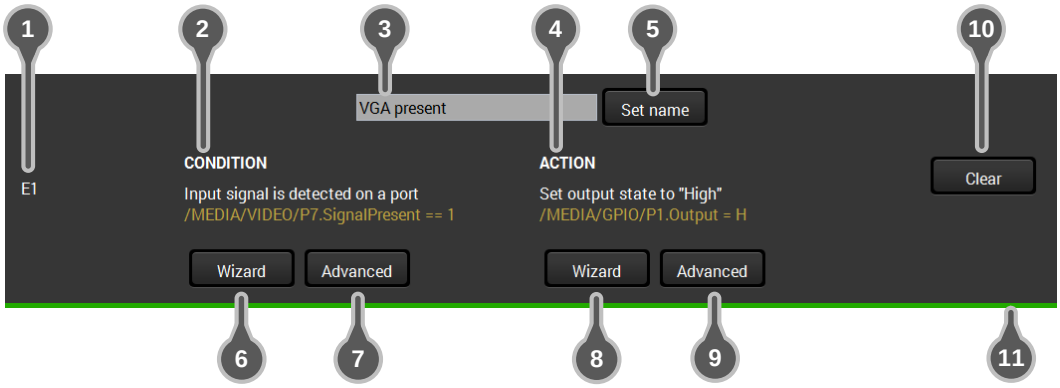


Figure 6-8. Event manager tab

20 events can be configured, which are available in Control/Events submenu. The user can see all the 20 events here and is able to modify them by the Wizard or the Advanced setting.

6.9.1. The event area

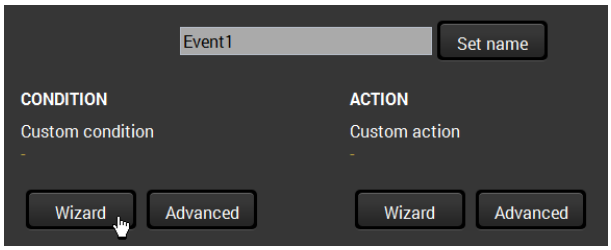


1 Number of the event	There are 20 events in the UMX-TPS-TX family. This label shows the number of them.
2 Condition	If the condition was set, the description (white colored text) and the exact LW3 protocol expression (yellow colored text) can be seen. If advanced mode was used the description is “Custom condition”.
3 Name of the event	Text as the name of the event can be stored. Click into the text box and type desired name.
4 Action	If the action was set, the description (white colored text) and the exact LW3 protocol expression (yellow colored text) can be seen. If advanced mode was used the description is “Custom action”.
5 Set name button	The device stores the name of the event if the Set name button was pressed.
6 Set condition (wizard)	Run the wizard to choose from the most common expressions as a condition.
7 Set condition (advanced)	Advanced setting contains wide range of LW3 expressions. If the desired expression cannot be set by wizard, use this method.
8 Set action (wizard)	Run the wizard to choose from the most common expressions as an action.
9 Set action (advanced)	Advanced setting contains wide range of LW3 expressions. If the desired expression cannot be set by wizard, use this method.
10 Clear event button	Unwanted events can be cleared with a single click on this button. Confirmation is needed for deleting.
11 Check bar	If the event is ready and syntactically correct the check bar becomes green.

6.9.2. Wizard mode

A simple wizard makes things easy for the user, because it lists the most common conditions and actions, so the user does not have to look for LW3 nodes and properties, the wizard does it instead. Conditions and actions also have their own button.

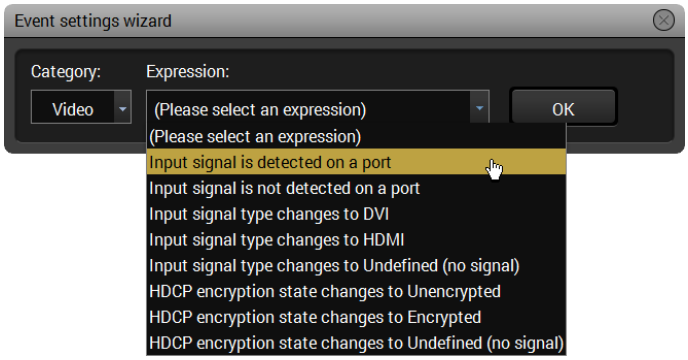
Step 1. Click on the Wizard button.



Step 2. Select the desired category from the drop-down menu.

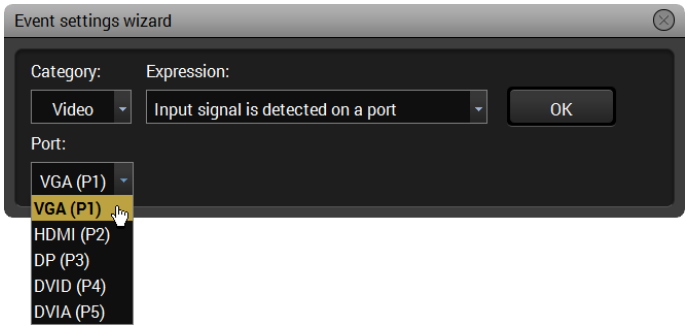
All the values can be changed during the whole process.

Step 3. Select an Expression.

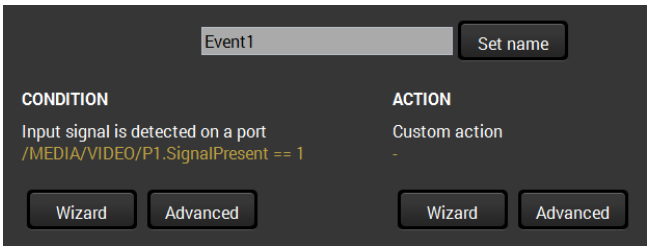


These values are listed in the "Event" column of the Conditions table on page 59.

The given expressions determine the further possible parameters. E.g. if the Expression is a video signal detection of any port on the Video layer, the port has to be defined in the following step.

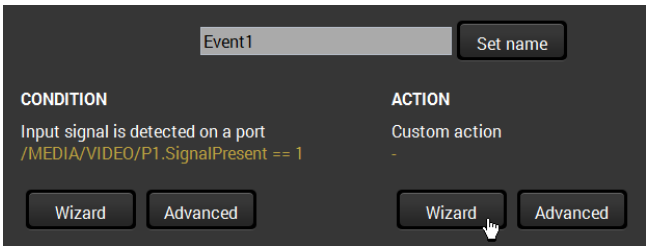


If the parameters are selected in the drop-down boxes, click on the OK to finish the wizard of the condition; the set condition can be seen above the buttons. The white text is the name of the selected condition. The yellow one is the accurate property name and value by LW3 protocol. You do not need to remember or note this text, LDC shows it continuously.

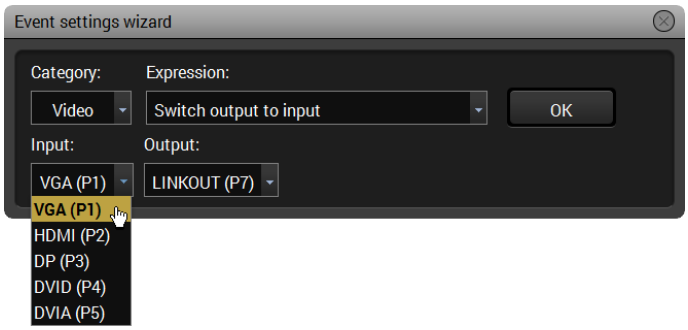


The action is the “reply” if the condition becomes true. There is no sequence between the condition and the action. Either of them can be set firstly.

Step 4. To set the action, click on the wizard button on the action side.

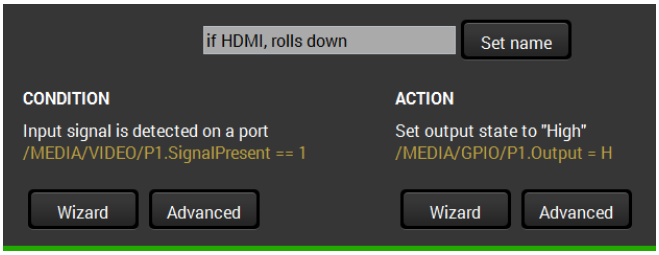


The process is the same. Click on the down arrow of the drop-down menu than select the desired item. The category and the expression can be set (the values are listed in the “Action” column of the Actions table on page 60). If the expression requires further parameter, select it. E.g. if the Expression is a switching on the video layer, the input and the output port has to be selected in the next step.



Step 5. Click on the OK to finish the wizard of the action.

The window of the wizard is closed; the created action can be seen above the buttons. The white text is the name of the selected action, the yellow is the accurate property (and its value) or method name by LW3 protocol. You do not need to remember or note this text, LDC shows it continuously. The system checks the validity of the event. If everything is correct, a green line can be seen at the bottom of the event area.



The following two tables contain the conditions and the actions which are available by the wizard.

Conditions of the Event Manager Wizard

Layer	Event	Port*	Path and value in LW3 protocol tree*
Video	Input signal is detected on a port	VGA(P1)	/MEDIA/VIDEO/P1.SignalPresent=1
	Input signal is not detected on a port	VGA(P1)	/MEDIA/VIDEO/P1.SignalPresent=0
	Input signal type changes to DVI	HDMI(P2)	/MEDIA/VIDEO/P2.SignalType=0
	Input signal type changes to HDMI	HDMI(P2)	/MEDIA/VIDEO/P2.SignalType=1
	Input signal type changes to Undefined (no signal)	HDMI(P2)	/MEDIA/VIDEO/P2.SignalType=F
	HDCP encryption state changes to Unencrypted	LINKOUT(P7)	/MEDIA/VIDEO/P7.HdcpActive=0
	HDCP encryption state changes to Encrypted	LINKOUT(P7)	/MEDIA/VIDEO/P7.HdcpActive=1
	HDCP encryption state changes to Undefined (no signal)	LINKOUT(P7)	/MEDIA/VIDEO/P7.HdcpActive=F
Audio	Input signal is detected on a port	HDMI(P2)	/MEDIA/AUDIO/P2.SignalPresent=1
	Input signal is not detected on a port	HDMI(P2)	/MEDIA/AUDIO/P2.SignalPresent=0
	Input signal type changes to PCM	HDMI(P2)	/MEDIA/AUDIO/P2.SignalType=0
	Input signal type changes to Compressed	HDMI(P2)	/MEDIA/AUDIO/P2.SignalType=1
	Input signal type changes to HBR	HDMI(P2)	/MEDIA/AUDIO/P2.SignalType=3
	Input signal type changes to Undefined (no signal)	HDMI(P2)	/MEDIA/AUDIO/P2.SignalType=F
GPIO	Input state changes to "High"	P1	/MEDIA/GPIO/P1.Input=H
	Input state changes to "Low"	P1	/MEDIA/GPIO/P1.Input=L
General	TPS link state changes to Connected	LINKOUT(P7)	/MEDIA/VIDEO/P7.LinkState=true
	TPS link state changes to Disconnected	LINKOUT(P7)	/MEDIA/VIDEO/P7.LinkState=false
	Display connected to receiver side	LINKOUT(P7)	/MEDIA/VIDEO/P7.ReceiverSense=true
	Display disconnected from receiver side	LINKOUT(P7)	/MEDIA/VIDEO/P7.ReceiverSense=false
	Show me button pressed	-	/SYS/MB/BUTTONS/ShowMePressed=1

* Referring to UMX-TPS-TX-140. Exact port numbers can be found in section 11.5 on page 123.

Table 6-1. Conditions of the Event Manager Wizard

Actions of the Event Manager Wizard

Layer	Action	Port*	Path and value in LW3 protocol tree*
Video	Switch TPS output to input	LINKOUT(P7)	/MEDIA/VIDEO/XP1:switch(P1:P7)
	Switch TPS output to next input	LINKOUT(P7)	/MEDIA/VIDEO/XP1:switchToNextInput(P7)
	Enable autoselect on output	LINKOUT(P7)	/MEDIA/VIDEO/XP1:setDestinationPortAutoselect(P7:E)
	Disable autoselect on output	LINKOUT(P7)	/MEDIA/VIDEO/XP1:setDestinationPortAutoselect(P7:D)
Audio	Switch TPS output to input:	LINKOUT(P6)	/MEDIA/AUDIO/XP1:switch(P1:P6)
	Switch TPS output to next input	LINKOUT(P6)	/MEDIA/AUDIO/XP1:switchToNextInput(P6)
	Enable autoselect on output	LINKOUT(P6)	/MEDIA/AUDIO/XP1:setDestinationPortAutoselect(P6:E)
	Disable autoselect on output	LINKOUT(P6)	/MEDIA/AUDIO/XP1:setDestinationPortAutoselect(P6:D)
GPIO	Set output state to “High”	P1	/MEDIA/GPIO/P1.Output=H
	Set output state to “Low”	P1	/MEDIA/GPIO/P1.Output=L
	Toggle output state	P1	/MEDIA/GPIO/P1:toggle()
RS-232	Send RS232 message**	P1	/MEDIA/UART/P1:sendMessage(…)

Table 6-2. Actions of the Event Manager Wizard

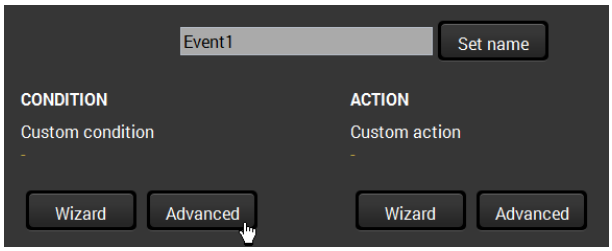
* Referring to UMX-TPS-TX-140. Exact port numbers can be found in section 11.5 on page 123.

** Messages may contain control characters e.g. carriage return or line feed, but in these cases the controlling characters have to be escaped. Escaping means injecting a backslash (‘\’) before the character that should be escaped (like in C language). Control characters are the followings: \ { } # % ( ) \r \n \t. When using the LDC, the escaping is done automatically. If you send a command from a third party device/terminal to the transmitter, the escaping has to be done manually: put the extra backslash before the control character. E.g. CALL /MEDIA/UART/P1:SendMessage(Message\\r\\n).

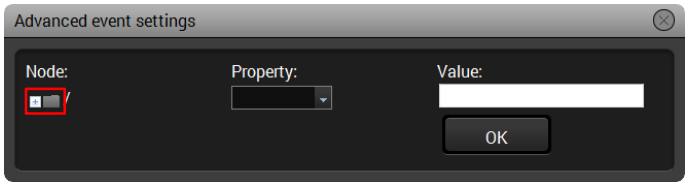
6.9.3. Advanced mode

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

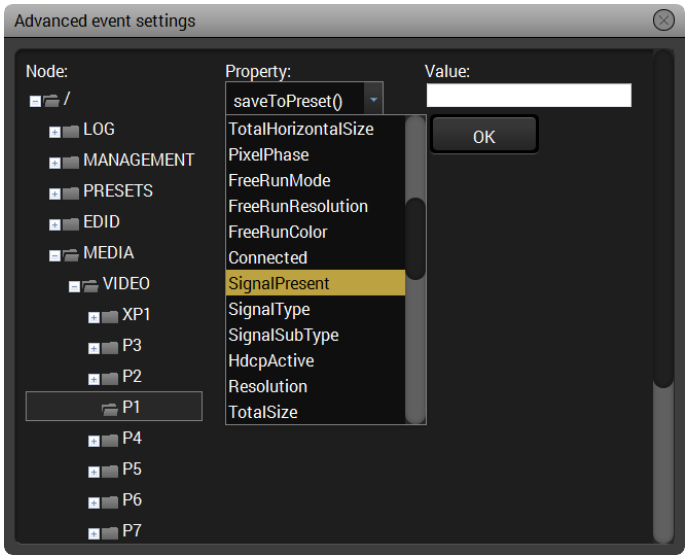
Step 1. Click the Advanced button. A new window comes up.



Step 2. Select the desired node and the property; on the left side there is the closed LW3 tree of the device. To open it, click on the plus or folder sign (in the red square).



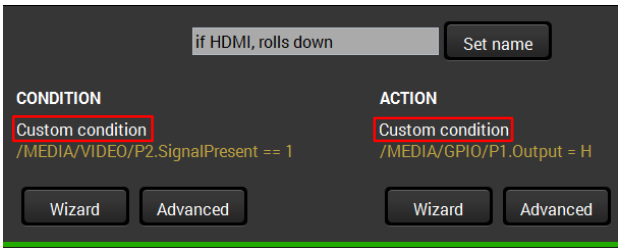
The tree structure is opened and the available properties are listed in the drop-down box. The manual of the selected property can be seen below it.



Step 3. Set the desired value in the field next to the list.

Step 4. Click on the OK button to apply the settings.

If the condition is set, define the action with the same method. In case of advanced mode, the type of the condition and the action is custom (in red square). The system checks the validity of the event; If it is valid, a green line can be seen at the bottom of the event area.



6.9.4. Save, load or clear an event

Save

Although the device stores the set events – even after reboot or firmware upgrade – event saving to the computer can be useful in some cases (e.g. transfer to another TPS device). Events can be stored in a readable CSV file (Comma Separated Values) which is a human readable file type and can be imported/edited by many spreadsheet application. To save all events click on Export to CSV, browse the desired folder, then click Save.

Export to CSV

Info: Events cannot be exported one by one. All events will be stored with the exportation.

Load

Click on the Import from CSV button. A browse window comes up. Find the .CSV file than click on the Open button.

Import from CSV

Clear

Click on the Clear button, a confirmation window comes up. Click on the OK button to clear the event. Clearing the events means setting them to the factory default values. The names become Event1..20, the condition and the action get empty value.

Clear

Clear all events

All events can be cleared at the same time with the loading factory default values. All the values will be cleared: names, conditions, actions. Click on the Load factory defaults button. A warning message appears. Confirm it by clicking on the OK button.

Load factory defaults

6.10. Settings menu

Device status information and network settings are available in this menu, function buttons help to do operations in connection with logs and device settings.

6.10.1. Status tab

General information is shown on this tab, such as device label, part number, serial number and hardware health, voltage and temperature values.

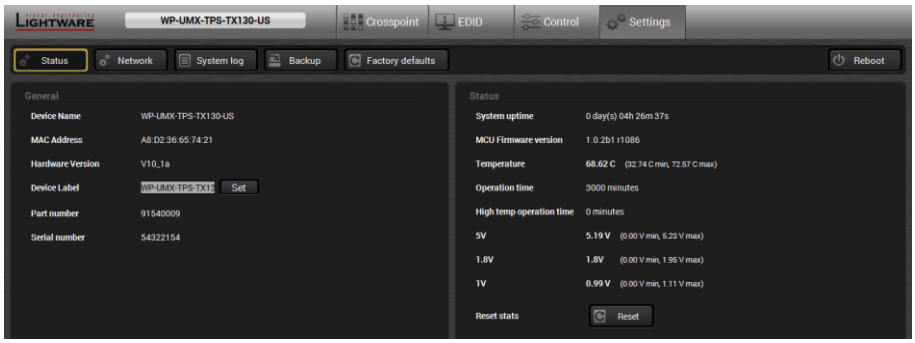


Figure 6-9. Status tab

6.10.2. Network tab

Network-related settings are available on the tab.

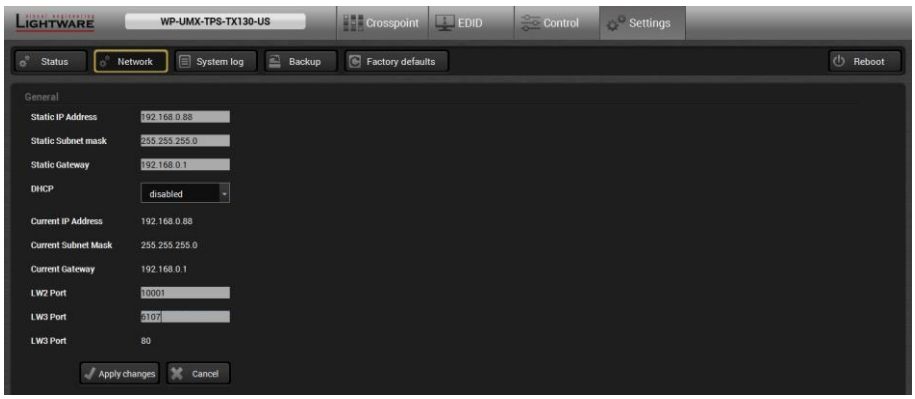


Figure 6-10. Network tab

The first three (two) lines are valid when the device has a fix IP address. If dynamic IP address is used, the DHCP setting shall be set to be enabled and the assigned IP parameters are indicated below the DHCP setting drop-down menu. The device is able to communicate with LW2 and LW3 protocols, the ports can be set here.

Info: Connecting to the transmitter via Ethernet and using LW2 port nr. (default is 10001) the device will accept LW2 protocol commands. Using LW3 port nr. (default is 6107) the device will accept LW3 protocol commands.

Always press the Apply changes button after modification to store the settings; you will be prompted to reboot the device to apply changes in practice.

6.10.3. Backup tab

The transmitter's settings can be saved and loaded to/from the computer. When creating a backup, the following settings are stored:

- All ports' settings (writeable properties' values) of all layers,
- Crosspoint settings of all layers,
- All EDID data stored in the User memory,
- All Events (from the Event manager), Presets and Network settings.

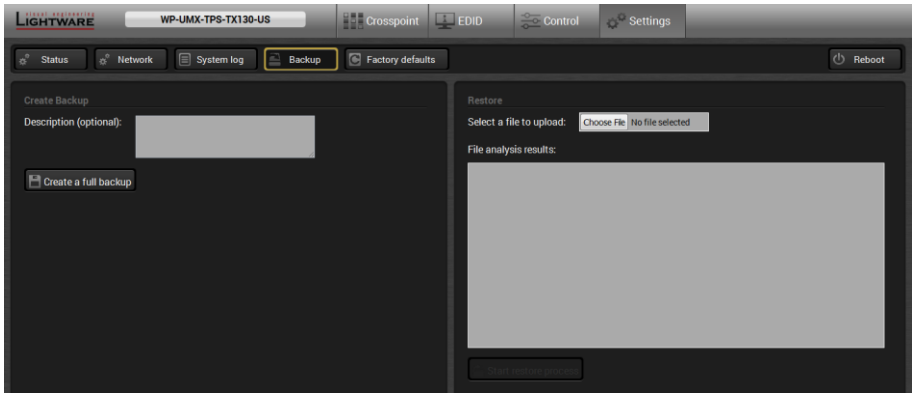


Figure 6-11. Backup tab

Create a full backup

Step 1. Arrange the desired settings in the transmitter.

Step 2. Navigate to Settings/Backup menu.

Step 3. Write a short description in the textbox on the left (optionally).

Step 4. Press the Create a full backup button. You will be prompted to save the collection information as a file to the computer (select the desired folder and save the file).

Restore a backup file

Previously saved backup file can be restored as follows:

Step 1. Navigate to the Settings/Backup menu.

Step 2. Click on the Choose file button on the right panel and browse the desired file. The file will be checked and the result will be displayed in the textbox below.

Step 3. Press the Start restore process button and the settings will be restored.

Info: Please note that the settings will be overwritten with the restored parameters in the transmitter permanently. Withdrawal is not possible.

6.10.4. Function buttons

System log button

Logged events can be collected and saved into a file which is useful when troubleshooting or in other special case for analyzing. Data collecting may take some minutes. You will be prompted about log generating before starting. When the collecting is done, the Save as window appears; select the desired location and press the Save button.

Factory defaults button

Factory default values can be restored by pressing the button; you will be asked to confirm. The connection will be terminated and the device is rebooted. Factory default values are listed in section 11.6 on page 125.

Reboot button

The device can be restarted; the connection will be terminated.

6.11. Advanced view

Advanced view is the surface for LW3 protocol tree with terminal window. Commands and specific parameters (which are not available on the user interface) can be run and set. Detailed information about the protocol, nodes, methods and parameters can be found in chapter 8 on page 80. Click on Close button to hide the Advanced view.

1 Terminal window

Commands and responses with time and date are listed in this window. Sent command is displayed in red and starts with '>' character, received response is displayed in blue and starts with '<' character. 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.

2 Command line

Type the desired command and execute it by the Send button.

3 Protocol tree

LW3 protocol tree; select an item to see its content.

4 Node list

Correspondent parameters and nodes are shown which are connected to the selected item in the protocol tree.

Manual button: Manual (short description) of the node can be called and displayed in the terminal window. See more information about manuals in section 8.3.4 on page 87.

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

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

7. 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.

7.1. LW2 protocol description

The device accepts commands surrounded by curly brackets - { } - and responds data surrounded by round brackets - ( ) - only if a command was successfully executed.

Legend for control commands:

<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
<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.)
<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

7.2. General LW2 commands

7.2.1. View product type

Description: The transmitter responds its name.

Format	Example
Command {i} Response (I:<PRODUCT_TYPE>)CrLf	→ {i} ← (I:UMX-TPS-TX140)CrLf

Explanation: The connected device is a UMX-TPS-TX140.

Legend: <PRODUCT_TYPE> shows type.

7.2.2. Query control protocol

Description: The transmitter can be controlled with different control protocols. This command queries the active protocol for the used control interface.

Format	Example
Command {P_?} Response (CURRENT●PROTOCOL●=●#<protocol>)CrLf	→ {P_?} ← (CURRENT PROTOCOL = #1)CrLf

Explanation: The device communicates with LW2 protocol.

7.2.3. View firmware version of the CPU

Description: View the CPU firmware revision.

Format	Example
Command {f} Response (FW:<FW_VER><s>)CrLf	→ {f} ← (FW:1.0.0b4 r972)CrLf

Legend: <FW_VER> is the firmware version. It is followed by <s> string which may indicate special versions. <s>=r indicates standard version.

7.2.4. Connection test

Description: Simple test to see if the connection is established successfully.

Format	Example
Command {PING} Response (PONG!)CrLf	→ {ping} ← (PONG!)CrLf

7.2.5. View serial number

Description: The transmitter responds its 8-digit serial number.

Format	Example
Command {s} Response (SN:<SERIAL_N>)CrLf	→ {s} ← (SN:12345671)CrLf

7.2.6. Compile time

Description: Returns the date, when the microcontroller firmware was compiled.

Format	Example
Command {CT} Response (Complied: <DATE&TIME>) CrLf	→ {ct} ← (Compiled: Sep 11 2014 18:05:41) CrLf

7.2.7. View installed board(s)

Description: Shows the hardware name and revision of the installed cards.

Format	Example
Command {is} Response (SL#●0●<MB_DESC>)CrLf (SL●END)CrLf	→ {is} ← (SL# 0 UMX-TPS-TX140 V10_2a) CrLf ← (SL END)CrLf

Explanation: The device reports its motherboard (slot 0).

7.2.8. View firmware for all controllers'

Description: Shows the firmware versions of all installed controllers.

Format	Example
Command {FC} Response (CF●<DESC>)CrLf (CF●<DESC>)CrLf … (CF END)CrLf	→ {fc} ← (CF UMX-TPS-TX140 1.0.0b4 r972)CrLf ← (CF END) CrLf

Explanation: The device has one control panel.

7.2.9. Restart matrix router

Description: The device can be restarted without unplugging power.

Format	Example
Command {RST} Response	→ {RST}

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

7.2.10. Query health status

Description: Internal voltages and measured temperature values are shown.

Format	Example
Command {ST} Response (ST●<DESC>)CrLf	→ {st} ← (ST CPU 11.96V 5.15V 1.86V 1.31V 1.01V 51.84C)CrLf

7.2.11. Restore factory default settings

Description: Settings can be reset to factory default values as follows:

Format	Example
Command {FACTORY=ALL} Response (FACTORY ALL…)CrLf	→ {factory=all} ← (FACTORY ALL…)CrLf

Explanation: All settings and parameters are reset to factory default, see the table in section 11.6 on page 125.

7.3. Port and crosspoint settings

7.3.1. Switch one input to one output

Following commands with <A/V/AV> option 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.

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

Description: Switch input <in> to output <out>.

Format	Example
Command {<in>@<out>●<layer>} Response (O<out²>●I<in²>●<layer>)CrLf	→ {2@1 av} ← (O01 I02 AV)CrLf

Explanation: Audio and video input 2 are switched to the output.

Legend: <layer>:

<layer>	Layer
A	Audio layer
V	Video layer
AV (or nothing)	Audio & Video layer

<out>: TPS output, type "O1" always.

<in> can be: Input port. The port numbering is different in the devices. See the details in section 11.5 on page 123.

Info: 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}. See section 7.3.6 on page 69.

Info: To achieve multiple switches executed together, see section 7.3.16 on page 72.

7.3.2. Mute specified output

Description: Mute output <out>. The output signal is turned off.

Format	Example
Command {#<out>●<layer>}	→ {#01 A}
Response (1MT<out²>●<layer>)CrLf	← (1MT01 A)CrLf

Explanation: The audio channel of the TPS output is muted.

Legend: See section 7.3.1 on page 67.

Info: Muting does not change the crosspoint's state, but disables the output itself. This way the last connection can be easily restored with an unmute command.

Info: Switching a muted output does not unmute the output.

7.3.3. Unmute specified output

Description: Unmute output <out>.

Format	Example
Command {+<out>●<layer>}	→ {+01 A}
Response (0MT<out²>●<layer>)CrLf	← (0MT01 A)CrLf

Explanation: The audio channel of the TPS output is unmuted.

Legend: See section 7.3.1 on page 67.

Info: Unmuting an output makes the previous connection active as the crosspoint's state has not been changed with the muting command, only the output was disabled.

7.3.4. Lock the output

Description: Lock output <out>. Output's state cannot be changed until unlocking.

Format	Example
Command {#><out>●<layer>}	→ {#>01 A}
Response (1LO<out²>●<layer>)CrLf	← (1LO01 A)CrLf

Explanation: Audio channel of the TPS output is locked.

Legend: See section 7.3.1 on page 67.

7.3.5. Unlock the output

Description: Unlock output <out>. The connection on output can be changed.

Format	Example
Command {+<<out>●<layer>}	→ {+<01 A}
Response (0LO<out²>●<layer>)CrLf	← (0LO01 A)CrLf

Explanation: Audio channel of the TPS output is unlocked.

Legend: See section 7.3.1 on page 67.

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

7.3.6. View connection state on the output

Description: Viewing the output's connection results in different response length, because it depends on the device. The response below refers to an UMX-TPS-TX140.

Format	Example
Command {VC●<layer>}	→ {vc av}
Response (ALL<layer>●<in^2>)CrLf	← (ALLV 02)CrLf ← (ALLA 01)CrLf

Legend: <layer>:

<layer>	Layer
A	Audio layer
V	Video layer
AV*	Audio & Video layer

* AV is not used in the response. When AV is typed in the commands, the response will result two lines, one for the Video and one for the Audio states.

Explanation: Video input port 2 and audio input port 1 are switched to the TPS output.

Info: If an output is locked, muted, or both locked and muted, the response format changes. If outputs are muted you get a letter 'M', if locked a letter 'L' and if muted and locked at the same time 'U' before the 2 digit numbers.

7.3.7. View crosspoint size

Description: Shows the physical crosspoint size.

Format	Example
Command {getsize●<layer>}	→ {getsize av}
Response (SIZE=<size>●<layer>)CrLf	← (SIZE=6x1 V)CrLf ← (SIZE=5x1 A)CrLf

Legend: <size>: <number of inputs>x<number of outputs>

<layer>: See section 7.3.6 on page 69.

Explanation: The device reports that it has a video crosspoint with 6 inputs and 1 output, and an audio crosspoint with 5 inputs and 1 output.

7.3.8. Query video Autoselect mode

Description: The autoselect mode of video output can be queried.

Format	Example
Command {AS_V<out>=?}	→ {as_v1=?}
Response (AS_V<out>=<state>;<mode>;<no_signal>)CrLf	← (AS_V1=E;K;B)CrLf

Legend: <out>: The output port number (1). See more details about port numbering in section 11.5 on page 123.

<state>: E = Autoselect is enabled; D = Autoselect is disabled

<mode>: P = Priority detect; K = First detect; L = Last detect

<no_signal>: B = Blank screen; M = Mute output

Explanation: The device reports that the Autoselect mode is enabled in first detect mode, and if there is no incoming signal at all, the crosspoint is not changed (blank screen).

For more information about the autoselect modes see the section 5.3 on page 32.

7.3.9. Change video Autoselect mode

Description: The autoselect mode of the video output can be changed.

Format		Example
Command	{AS_V<out>=<state>;<mode>;<no_signal>}	→ {as_v1=E;K;B}
Response	(AS_V<out>=<state>;<mode>;<no_signal>)CrLf	← (AS_V1=E;K;B)CrLf

Legend: See section 7.3.8 on page 69.

Explanation: The Autoselect mode is enabled in first detect mode, and if there is no incoming signal at all, the crosspoint is not changed (blank screen).

7.3.10. Query audio Autoselect mode

Description: The autoselect mode of audio output can be queried.

Format		Example
Command	{AS_A<out>=?}	→ {as_a1=?}
Response	(AS_A<out>=<state>;<mode>;<no_signal>)CrLf	← (AS_A1=E;K;B)CrLf

Legend:

<out>:	The output port number (1). See more details about port numbering in section 11.5 on page 123.
<state>:	E = Autoselect is enabled; D = Autoselect is disabled
<mode>:	P = Priority detect; K = First detect; L = Last detect; S = Static
<no_signal>:	B = Blank; M = Mute output

Explanation: The device reports that the Autoselect mode is enabled in first detect mode, and if there is no incoming signal at all, the crosspoint is not changed.

7.3.11. Change audio Autoselect mode

Description: The autoselect mode of audio output port can be changed.

Format		Example
Command	{AS_A<out>=<state>;<mode>;<no_signal>}	→ {as_a1=E;K;B}
Response	(AS_A<out>=<state>;<mode>;<no_signal>)CrLf	← (AS_A1=E;K;B)CrLf

Legend: See section 7.3.8 on page 69.

Explanation: The Autoselect mode is enabled in first detect mode, and if there is no incoming signal at all, the crosspoint is not changed.

7.3.12. Query video input priorities

Description: The settings of video input priority can be queried as follows.

Format		Example
Command	{PRIO_V<out>=?}	→ {prio_v1=?}
Response	(PRIO_V<out>=<in1_prio>;<in2_prio>;..;<in$_n$_prio>)CrLf	← (PRIO_V1=1;0;2;3;4;31)CrLf

Legend:

<out>:	The output port number (1).
<in1_prio>…<in$_n$_prio>:	Input ports' priority number. See more details about port numbering in section 11.5 on page 123.

Explanation: P2 has the highest priority (0), P1 has the second highest priority number (1). P6 has priority 31 which is the lowest possible setting; it means P6 is disabled from the priority list and cannot be selected.

7.3.13. Change video input priorities

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

Format		Example1
Command	{PRIO_V<out>=<in1_prio>;<in2_prio>;…;<in$_n$_prio>}	→ {prio_v1=1;0;2;3;4;5}
Response	(PRIO_V<out>=<in1_prio>;<in2_prio>;…;<in$_n$_prio>)CrLf	← (PRIO_V1=1;0;2;3;4;5)CrLf

Legend: <out>: The output port number (1).

<in1_prio>…<in$_n$_prio>: Input ports' priority number. See more details about port numbering in section 11.5 on page 123.

Explanation: P2 has the highest priority (0), P1 has the second highest (1). P5 has the lowest priority (5).

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

7.3.14. Query audio input priorities

Description: The settings of audio input priority can be queried as follows.

Format		Example
Command	{PRIO_A<out>=?}	→ {prio_a1=?}
Response	(PRIO_A<out>=<in1_prio>;<in2_prio>;..;<in$_n$_prio>)CrLf	← (PRIO_A1=1;0;2;3;4;31)CrLf

Legend: <out>: The output port number (1).

<in1_prio>…<in$_n$_prio>: Input ports' priority number. See more details about port numbering in section 11.5 on page 123.

Explanation: P2 has the highest priority (0), P1 has the second highest priority number (1). P6 has priority 31 which is the lowest possible setting; it means P6 is disabled from the priority list and cannot be selected.

7.3.15. Change audio input priorities

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

Format		Example
Command	{PRIO_A<out>=<in1_prio>;<in2_prio>;…;<in$_n$_prio>}	→ {prio_a1=1;0;2;3;4;5}
Response	(PRIO_A<out>=<in1_prio>;<in2_prio>;…;<in$_n$_prio>)CrLf	← (PRIO_A1=1;0;2;3;4;5)CrLf

Legend: <out>: The output port number (1).

<in1_prio>…<in$_n$_prio>: Input ports' priority number. See more details about port numbering in section 11.5 on page 123.

Explanation: P2 has the highest priority (0), P1 has the second highest (1). P5 has the lowest priority (5).

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

7.3.16. Batch switch outputs

Description: The device is capable of switching multiple outputs exactly at the same time. To do this, the normal switch commands have to be used. If the switch commands arrive to the device with less than 10 milliseconds delay, the commands are collected and changes the output connections together.

Required circumstances:

- Switch commands have this format: {<in>@<out>}{<in>@<out>}
- The delay between two '}' characters must be below 10 milliseconds
- No other command or junk character is allowed between switch commands
- Affected outputs must not be locked

If any of the above circumstances fail, then the commands will be processed separately and the output connections will change one by one.

Info: The delay timeout applies for the receiving time of characters. Please note that if LAN connection is used then the network may cause additional delays. This could result that batch switching does not occur.

The below example shows a command that resulted batch switching:

One by one commands	Batch commands
→ {02@01 V}CrLf ← (O01 I02 V)CrLf	→ {02@01 V}{01@01 A}CrLf ← (O01 I02 V)CrLf ← (O01 I01 A)CrLf
→ {01@01 A}CrLf ← (O01 I01 A)CrLf	

7.4. RS-232 port configuration

7.4.1. Query the RS-232 mode

Description: The RS-232 mode can be queried as follows:

Format	Example
Command {RS232=?} Response (RS232=<mode>)CrLf	→ {rs232=?} ← (RS232=CONTROL)CrLf

Legend: <mode>: CONTROL = Control mode is enabled,
PASS = Pass mode is enabled,
CI = Command injection mode is enabled.

Explanation: Current RS-232 mode is Control mode.

7.4.2. Change RS-232 mode

Description: The RS-232 mode can be changed as follows:

Format	Example
Command {RS232=<mode>} Response (RS232=<mode>)CrLf	→ {rs232=pass} ← (RS232=PASS)CrLf

Legend: See section 7.4.1 on page 72.

Explanation: The RS-232 mode is set to Pass mode.

7.4.3. Query the RS-232 port settings

Description: The RS-232 port settings can be queried as follows:

Format	Example1
Command {RS232_LOCAL_FORMAT=?} Response (RS232_LOCAL_FORMAT= <baud>;<data bits>; <parity>; <stop bits>)CrLf	→ {rs232_local_format=?} ← (RS232_LOCAL_FORMAT=57600; 8;N;1)CrLf

Legend:
<baud>: Baud rate which can be 4800, 7200, 9600, 14400, 19200, 38400, 57600, 115200
<data bits>: 8 or 9
<parity>: N (none), O (odd), E (even)
<stop bits>: 1, 1.5, 2

Explanation1: Current RS-232 settings on local port: Baud rate is 57600, 8 data bits, no parity, 1 stop bit.

Format	Example2
Command {RS232_LINK_FORMAT=?} Response (RS232_LINK_FORMAT= <baud>;<data bits>; <parity>; <stop bits>)CrLf	→ {rs232_link_format=?} ← (RS232_LINK_FORMAT=9600; 8;N;1)CrLf

Legend: Same as above.

Explanation2: Current RS-232 settings on link port: Baud rate is 9600, 8 data bits, no parity, 1 stop bit.

7.4.4. Change RS-232 port settings

Description: The RS-232 port settings can be set as follows:

Format	Example1
Command {RS232_LOCAL_FORMAT= <baud>;<data bits>; <parity>; <stop bits>} Response (RS232_LOCAL_FORMAT= <baud>;<data bits>; <parity>; <stop bits>)CrLf	→ {rs232_local_format=57600;9;N;1} ← (RS232_LOCAL_FORMAT=57600; 9;N;1)CrLf

Legend: See section 7.4.3 on page 73.

Explanation1: RS-232 settings on the local port have been set as follows: Baud rate is 57600, 9 data bits, no parity, 1 stop bit.

Format	Example2
Command {RS232_LINK_FORMAT= <baud>;<data bits>; <parity>; <stop bits>} Response (RS232_LINK_FORMAT= <baud>;<data bits>; <parity>; <stop bits>)CrLf	→ {rs232_link_format=9600;9;N;1} ← (RS232_LINK_FORMAT=9600; 9;N;1)CrLf

Legend: See section 7.4.3 on page 73.

Explanation2: RS-232 settings on the link port have been set as follows: Baud rate is 9600, 9 data bits, no parity, 1 stop bit.

Info: If the device is connected to an MX-TPS-IB, the port settings (Baud rate, databits, stop bits, parity) are ignored, since the followings pre-defined values are valid: 115200 8N1.

7.4.5. Query the RS-232 protocol

Description: The RS-232 protocol can be queried as follows:

Format		Example1
Command	{RS232_LOCAL_PROT=?}	→ {rs232_local_prot=?}
Response	(RS232_LOCAL_PROT=<protocol>)CrLf	← (RS232_LOCAL_PROT=LW2)CrLf

Legend: <protocol>: LW2 or LW3.

Explanation1: Current protocol on local RS-232 port is LW2.

Format		Example2
Command	{RS232_LINK_PROT=?}	→ {rs232_link_prot=?}
Response	(RS232_LINK_PROT=<protocol>)CrLf	← (RS232_LINK_PROT=LW2)CrLf

Legend: <protocol>: LW2 or LW3

Explanation2: Current protocol on link RS-232 port is LW2.

7.4.6. Change RS-232 protocol

Description: The RS-232 protocol can be set as follows:

Format		Example1
Command	{RS232_LOCAL_PROT=<protocol>}	→ {rs232_local_prot=LW3}
Response	(RS232_LOCAL_PROT=<protocol>)CrLf	← (RS232_LOCAL_PROT=LW3)CrLf

Legend: <protocol>: LW2 or LW3

Explanation1: Current protocol on local RS-232 port is set to LW3.

Format		Example2
Command	{RS232_LINK_PROT=<protocol>}	→ {rs232_link_prot=LW3}
Response	(RS232_LINK_PROT=<protocol>)CrLf	← (RS232_LINK_PROT=LW3)CrLf

Legend: <protocol>: LW2 or LW3

Explanation2: Current protocol on link RS-232 port is set to LW3.

Info: If the device is connected to an MX-TPS-IB board, the active protocol is always LW2 on the link RS-232 port, LW3 is not supported through the link in this case. Besides the port settings (Baud rate, databits, stop bits, parity) are ignored, since the followings pre-defined values are valid: 115200, 8N1. The user can set the protocol to LW3, but this setting will take effect only after connecting UMX-TPS to a TPS-RX-90/95 receiver.

7.5. Network configuration

7.5.1. Query the current IP status

Description: IP address settings can be queried as follows.

Format		Example
Command	{IP_STAT=?}	→ {ip_stat=?}
Response	(IP_STAT=<type>;<ip_address>;<subnet_mask>;<gateway_addr>)CrLf	← (IP_STAT=1;192.168.0.102;255.255.255.0;192.168.0.1)CrLf

Legend: <type>: 0 = fix IP; 1 = 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)

Explanation: The device has a dynamic IP address: 192.168.0.102; subnet mask is 255.255.255.0, gateway address is 192.168.0.1.

7.5.2. Query the IP address

Description: IP address can be queried from the device with this command.

Format		Example
Command	{IP_ADDRESS=?}	→ {ip_address=?}
Response	(IP_ADDRESS=<type>; <ip_address>)CrLf	← (IP_ADDRESS=0;192.168.0.100) CrLf

Legend: <type>: 0 = fix IP; 1 = DHCP

Info: 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.

7.5.3. Set the IP address

Description: IP address can be set as follows.

Format		Example
Command	{IP_ADDRESS=<type>; <ip_address>}	→ {ip_address=0;192.168.0.100}
Response	(IP_ADDRESS=<type>; <ip_address>)CrLf	← (IP_ADDRESS=0;192.168.0.100) CrLf

Legend: <type>: 0 = fix IP; 1 = DHCP

Info: Restarting the transmitter is necessary to apply the changes after modification.

7.5.4. Query the subnet mask

Description: Subnet mask can be queried as follows.

Format		Example
Command	{IP_NETMASK=?}	→ {ip_netmask=?}
Response	(IP_NETMASK=<subnet_ mask>)CrLf	← (IP_NETMASK=255.255.255.0)CrLf

Legend: <subnet_mask>: Four decimal octets separated by dots.

Info: The response contains the fix subnet mask that is stored in the device even if DHCP is enabled; in this case this subnet mask is not valid.

7.5.5. Set the subnet mask

Description: Subnet mask can be set as follows.

Format		Example
Command	{IP_NETMASK=<subnet_ mask>}	→ {ip_netmask=255.255.255.0}
Response	(IP_NETMASK=<subnet_ mask>)CrLf	← (IP_NETMASK=255.255.255.0)CrLf

Legend: <subnet_mask>: Four decimal octets separated by dots.

7.5.6. Query the gateway address

Description: Gateway address can be queried as follows.

Format	Example
Command {IP_GATEWAY=?} Response (IP_GATEWAY=<gateway_ addr>)CrLf	→ {ip_gateway=?} ← (IP_GATEWAY=192.168.0.1)CrLf

Legend: <gateway_addr>: Four decimal octets separated by dots.

Info: The response contains the fix gateway address that is stored in the device even if DHCP is enabled; in this case this gateway address is not valid.

7.5.7. Set the gateway address

Description: Gateway address can be set as follows.

Format	Example
Command {IP_GATEWAY=<gateway_ addr>} Response (IP_GATEWAY=<gateway_ addr>)CrLf	→ {ip_gateway=192.168.0.50} ← (IP_GATEWAY=192.168.0.50)CrLf

Legend: <gateway_addr>: Four decimal octets separated by dots.

7.5.8. Query the TCP/IP port

Description: TCP/IP port setting can be queried as follows.

Format	Example1
Command {LW2_PORT=?} Response (LW2_PORT=<port_nr>)CrLf	→ {lw2_port=?} ← (LW2_PORT=10001)CrLf

Explanation1: The port number for LW2 protocol is 10001 (default value).

Format	Example2
Command {LW3_PORT=?} Response (LW3_PORT=<port_nr>)CrLf	→ {lw3_port=?} ← (LW3_PORT=6107)CrLf

Explanation2: The port number for LW3 protocol is 6107 (default value).

7.5.9. Set the TCP/IP port

Description: TCP/IP port setting can be set as follows.

Format	Example1
Command {LW2_PORT=<port_nr>} Response (LW2_PORT=<port_nr>)CrLf	→ {lw2_port=10001} ← (LW2_PORT=10001)CrLf

Explanation1: The port number for LW2 protocol is set to 10001 (default value).

Format	Example2
Command {LW3_PORT=<port_nr>} Response (LW3_PORT=<port_nr>)CrLf	→ {lw3_port=6107} ← (LW3_PORT=6107)CrLf

Explanation2: The port number for LW3 protocol is set to 6107 (default value).

7.5.10. Query the status of Ethernet ports

Description: The link, the local Ethernet ports, and the TCP/IP connections to the CPU can be enabled or disabled with this command. E.g. if the local Ethernet port is disabled, a control PC can only connect from the remote side Ethernet via TCP/IP.

Format		Example
Command	{ETH_ENABLE=?}	→ {eth_enable=?}
Response	(ETH_ENABLE=<cpu>;<local>;<link>)CrLf	← (ETH_ENABLE=1;1;1)CrLf

Legend:
<cpu>: 0 = TCP/IP disabled, 1 = TCP/IP enabled
<local>: 0 = local Ethernet is disabled, 1 = local Ethernet is enabled
<link>: 0 = link Ethernet is disabled, 1 = link Ethernet is enabled

Explanation: The gateway address is set to 192.168.0.50.

7.5.11. Set the status of Ethernet ports

Description: Enable or disable the link, the local Ethernet ports, and the TCP/IP connections to the CPU.

Format		Example
Command	{ETH_ENABLE=<cpu>;<local>;<link>}	→ {eth_enable=X;X;0}
Response	(ETH_ENABLE=<cpu>;<local>;<link>)CrLf	← (ETH_ENABLE=1;1;0)CrLf

Legend: see section 7.5.10 on page 77.
"X" parameter can be used to prevent modifying a parameter.

Explanation: The link Ethernet port is set to disabled, the other ports are not modified.

7.6. GPIO settings

7.6.1. Query the state of a GPIO pin

Description: The state of a GPIO pin can be queried as follows.

Format		Example
Command	{GPIO<pin_nr>=?}	→ {gpio1=?}
Response	(GPIO<pin_nr>=<direction>;<level>)CrLf	← (GPIO1=I;H)CrLf

Legend:
<pin_nr>: GPIO pin number (1-7).
<direction>: Direction of the pin: I = input, O = output
<level>: H = high level, L = low level.

Explanation: GPIO pin #1 is input, input level is high.

7.6.2. Set the state of a GPIO pin

Description: The state of a GPIO pin can be set as follows.

Format		Example
Command	{GPIO<pin_nr>=<direction>;<level>}	→ {gpio1=i;l}
Response	(GPIO<pin_nr>=<direction>;<level>)CrLf	← (GPIO1=I;L)CrLf

Legend: See section 7.6.1 on page 77.

Explanation: GPIO pin #1 is set as input, input level is low.

7.7. LW2 commands – Quick summary

General LW2 commands

Operation	See in chapter	Command
View product type	7.2.1	{i}
Query control protocol	7.2.2	{P_?}
View firmware version of the CPU	7.2.3	{f}
Connection test	7.2.4	{PING}
View serial number	7.2.5	{S}
Compile time	7.2.6	{CT}
View installed board(s)	7.2.7	{IS}
View firmware for all controllers'	7.2.8	{FC}
Restart matrix router	7.2.9	{RST}
Query health status	7.2.10	{ST}
Restore factory default settings	7.2.11	{FACTORY=ALL}

Port and crosspoint settings

Operation	See in chapter	Command
Switch one input to one output	7.3.1	{<in>@<out>●<layer>}
Mute specified output	7.3.2	{#<out>●<layer>}
Unmute specified output	7.3.3	{+<out>●<layer>}
Lock the output	7.3.4	{#><out>●<layer>}
Unlock the output	7.3.5	{+<out>●<layer>}
View connection state on the output	7.3.6	{VC●<layer>}
View crosspoint size	7.3.7	{GETSIZE●<layer>}
Query video Autoselect mode	7.3.8	{AS_V<out>=?}
Change video Autoselect mode	7.3.9	{AS_V<out>=<state>;<mode>;<no_signal}>
Query audio Autoselect mode	7.3.10	{AS_A<out>=?}
Change audio Autoselect mode	7.3.11	{AS_A<out>=<state>;<mode>;<no_signal>}
Query video input priorities	7.3.12	{PRIO_V<out>=?}
Change video input priorities	7.3.13	{PRIO_V<out>=<in1_prio>;…;<in$_n$_prio>}
Query audio input priorities	7.3.14	{PRIO_A<out>=?}
Change audio input priorities	7.3.15	{PRIO_A<out>=<in1_prio>;…;<in$_n$_prio>}
Batch switch outputs	7.3.16	{<in>@<out>●<layer>}{<in>@<out>●<layer>}

RS-232 port configuration

Operation	See in chapter	Command
Query the RS-232 mode	7.4.1	{RS232=?}
Change RS-232 mode	7.4.2	{RS232=<mode>}
Query the RS-232 port settings	7.4.3	{RS232_LOCAL_FORMAT=?}
Change RS-232 port settings	7.4.4	{RS232_LOCAL_FORMAT=<baud>; <data bits>; <parity>; <stop bits>}
Query the RS-232 protocol	7.4.5	{RS232_LOCAL_PROT=?}
Change RS-232 protocol	7.4.6	{RS232_LOCAL_PROT=<protocol>}

Network configuration

Operation	See in chapter	Command
Query the current IP status	7.5.1	{IP_STAT=?}
Query the IP address	7.5.2	{IP_ADDRESS=?}
Set the IP address	7.5.3	{IP_ADDRESS=<type>;<ip_address>}
Query the subnet mask	7.5.4	{IP_NETMASK=?}
Set the subnet mask	7.5.5	{IP_NETMASK=<subnet_mask>}
Query the gateway address	7.5.6	{IP_GATEWAY=?}
Set the gateway address	7.5.7	{IP_GATEWAY=<gateway_addr>}
Query the TCP/IP port	7.5.8	{LW2_PORT=?}
Set the TCP/IP port	7.5.9	{LW2_PORT=<port_nr>}
Query the status of Ethernet ports	7.5.10	{ETH_ENABLE=?}
Set the status of Ethernet ports	7.5.11	{ETH_ENABLE=<cpu>;<local>;<link>}

GPIO settings

Operation	See in chapter	Command
Query the state of a GPIO pin	7.6.1	{GPIO<pin_nr>=?}
Set the state of a GPIO pin	7.6.2	{GPIO<pin_nr>=<direction>;<level>}

8. LW3 Programmers' reference

8.1. Overview

Lightware 3 (LW3) protocol is currently used by the UMX-TPS-TX100 series, the MODEX family, the 25G product line and will be the preferred protocol in the new developments.

The protocol (LW3) 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 for implementing a human readable, but programmatically still ease to parse, which is suitable for different products with different feature list.

In order to implement a flexible, easy-to-use protocol that is straightforward to adapt to new devices and provides outstanding scalability and sustainability, we decided to organize all settings, parameters and properties of the device to a tree structure with 'nodes', 'properties' and 'methods'.

8.1.1. Elements of the tree structure

Important! *All names and values are case sensitive. The space character is replaced by '●' character in the elements and commands descriptions.*

Node

- The basic building block of the tree structure is the 'node'.
- A node can have multiple child nodes, but only one parent.
- The tree has only one root the 'root node'.
- The leaves of the tree are also nodes, which do not have child nodes.
- The nodes are separated by a slash ('/') character.
- All the slashes are 'right slashes', no backslash is used.
- The identifier of the root node is a slash ('/')
- Nodes' name can contain the elements of the English alphabet and numbers.
- Recommended convention for case sensitivity:
  - Fix nodes (that cannot be altered) are capitalized.
  - User created nodes can contain both lowercase and capital letters, no restrictions.
- The path of a node has to contain all parent nodes from the root node.

Format (the root node): nX●/

Path: nX●/[nodeName]/[nodeName]/[nodeName]

Legend: **'**n': node

'X' can be:

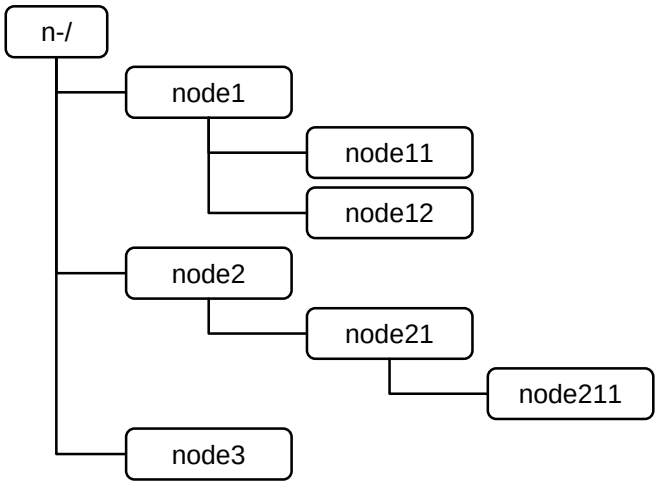
'-': default for a node,

'm': this is a manual for the node,

'E': this is an error message for the node.

Info: *All parent nodes must be listed in the path of a node.*

Following example presents the structure of the tree traversal:



Path of the nodes:

n-/node1
n-/node1/node11
n-/node1/node12
n-/node2
n-/node2/node21
n-/node2/node21/node211
n-/node3

Figure 8-1. Tree structure of nodes

Property

The 'property' in the LW3 protocol is basically a leaf, which has a well-defined value.

- A property has a value.
- A property cannot have child nodes or child properties. It is always a leaf.
- A node can have any number of properties (may not have any).
- A property is referenced with a dot ('.') after the node name.
- The properties' name can contain the elements of the English alphabet, numbers and underscore ('_') character.
- By convention, properties are beginning with capital letter, all other characters are lowercase ones. In case of compound words, all words are beginning with a capital letter (CamelCase).
- The value of the property can contain any readable ASCII character.
- A property can be read-only or read/write.

Format: pX●/[nodeName].[propertyName]=[propertyValue]

Legend: p: property

X can be:

'r': if the property is read-only.

'w': if the property is readable, writable.

'm': manual for the property.

'E': error message for the property.

Example:

The following two ones are read-only properties:

pr●/node1/node12.ReadOnlyProperty=value1

pr●/.DeviceName=25G Hybrid Device

The following two ones are read-write properties:

pw●/node1/node12.ReadWriteProperty=value2

pw●/.DeviceNickName=John

Method

The ‘method’ in the LW3 protocol is also a leaf. It cannot have a value, such as the properties, but it can be invoked with a parameter with the help of a special ‘CALL’ command.

- A method cannot have child nodes or child methods. It is always a leaf.
- A node can have any number of methods (may not have any).
- A method is referenced with a colon (‘:’) after the node.
- The methods’ name can contain the elements of the English alphabet, numbers and underscore (‘_’) character.
- By convention, methods are beginning with lowercase letter. In case of compound words, the very first letter is lowercase, and the first letter of each other words are capitalized (lowerCamelCase).
- The parameter of the method can contain any readable ASCII character.
- The method always has a return ‘state’ if the method could be executed. The state could be either ‘OK’ or ‘FAILED’.
- The method not necessarily has a return ‘value’. If it does, it can contain additional information, which is always specific for the current case (the return value can specify why the execution failed).
- When the method cannot be executed (e.g. the parameter list is illegal), there is an error message.

Format: mX●/[nodeName]:[methodName]=[returnValue]

Legend: m: method

X can be:

‘O’: when the execution of the method was successful (OK),

‘F’: when the execution of the method failed,

‘m’: manual for the method,

‘E’: error message for the method.

Example:

mO●/node1/node12:method1

mO●/MEDIA/VIDEO/XP1:switch

mE●%E001:Syntax error

mm●/MEDIA/VIDEO/XP1:lockSource:Lock one or more source ports

8.1.2. Escaping

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 followings: \ { } # % ( ) \r \n \t

Example:

The original text: John●(Doe).●#3:●5%2=1●node1\node11

The escaped text: John●\(Doe\).●\#3:●5\%2=1●node1\\node11

When using the LDC, the escaping is done automatically. If you send a command from a third party device/terminal to the transmitter, the escaping has to be done manually. In this case put an extra backslash before the control character.

Example:

CALL /MEDIA/UART/P1:SendMessage(My_message\\r\\n)

8.1.3. Error messages

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

Format: XE●[primitive]●%EYYY:●[Error message]

Legend: X can be:

'-': syntax error. Cannot parse the command at all.

'n': node error.

'p': property error.

'm': method error.

YYY: error code, which can be one of the followings:

E001	Syntax error	E010	Illegal parameter count
E002	Node not found	E011	Item already exist
E003	EOL expected	E012	Item does not exist
E004	Writing read-only property	E013	Illegal operation
E005	Invalid value	E014	Internal error
E006	Property does not exist	E015	Access denied
E007	Syntax error	E016	Write access denied
E008	Illegal method	E017	Reserved
E009	Method does not exist	E018	Waiting timeout

8.1.4. Prefix summary

The following prefixes are defined in the LW3 protocol:

'n-': a node,

'nE': an error for a node,

'nm': a manual for 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,

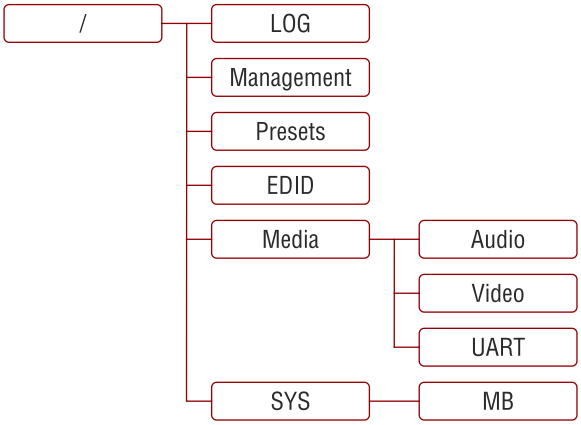
'mF': a response after a failed method execution,

'mE': an error for a method,

'mm': a manual for a method.

8.2. The tree structure of UMX-TPS devices

The /MEDIA node is used by the LDC to connect input ports to output ports on different layers. Each subnode of /MEDIA is representing a layer, e.g. video (/MEDIA/VIDEO), audio (/MEDIA/AUDIO) or RS-232 (/MEDIA/UART). Each layer has a crosspoint to define connections between the ports associated to the layer, all of them are represented by a specific node. E.g. the video layer node is /MEDIA/VIDEO: under the video layer node, the video crosspoint node (XP1) and the video ports (P1, P2, …) are located.



The tree structure is available in the Advanced view of LDC, see section 6.11 on page 64.

8.3. LW3 commands

8.3.1. 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.

The response format

The first two characters of a response are unambiguously identifies the type of the element that the response line concerns. The first character is the type of the element (node, property or method), the second is for miscellaneous information (e.g. read/write rights).

The defined prefixes are:

‘n-’: node

‘pr’: property - only readable

‘pw’: property - writable, readable

‘m-’: method executable

After the prefix the response contains the full path of the node, property or method after a space character.

Get all children of a node

Get all of the child nodes of a parent node, with one GET command.

Command format: GET●[nodePath]

Response format: n-●[nodePath]

Example:

```
> GET●/MEDIA
< n-●/MEDIA/VIDEO
< n-●/MEDIA/AUDIO
< n-●/MEDIA/UART
< n-●/MEDIA/IR
< n-●/MEDIA/GPIO
< n-●/MEDIA/ETHERNET
```

Get all properties and methods of a node

Get all properties and methods of a node, with one GET command and asterisk character.

Command format: GET●[nodePath].*

Response format: (for properties)

pX●[nodePath].[propertyName]=[parameter]

Legend: X can be:

'r': read-only

'w': read-write

Response format: (for methods)

m-●[nodePath]:[methodName]

Example:

```
> GET●/EDID.*
< pr●/EDID.EdidStatus=F48:E1;F49:E2;F48:E3;F48:E4;F48:E5
< m-●/EDID:switch
< m-●/EDID:switchAll
< m-●/EDID:copy
< m-●/EDID:delete
< m-●/EDID:reset
```

Get all child nodes, properties and methods of a node

Get all child nodes, properties and methods of a node with one command, without using a wildchar.

Command format: GETALL●[nodePath]

Response format: (for nodes)

n-●[nodePath]

Response format: (for properties)

pX●[nodePath].[propertyName]=[parameter]

Legend: X can be:

'r': read-only

'w': read-write

Response format: (for methods)

m-●[nodePath]:[methodName]

Example:

```
> GETALL●/EDID
< n-●/EDID/F
< n-●/EDID/D
< n-●/EDID/U
< n-●/EDID/E
< pr●/EDID.EdidStatus=F48:E1;F49:E2;F48:E3;F48:E4;F48:E5
< m-●/EDID:switch
< m-●/EDID:switchAll
< m-●/EDID:copy
< m-●/EDID:delete
< m-●/EDID:reset
```

8.3.2. Set command

The setter command can be used to modify the value of a property.

Command format: SET●[nodePath].[propertyName]=[newPropertyValue]

Response format:

The response for setting a property to a new value is the same as the response for the 'GET' command. The value in the response is the new value if the execution of the 'SET' command was successful, otherwise the unmodified 'old value' with an error message.

pw●[nodePath].[propertyName]=[newPropertyValue]

Example:

```
> SET●/SYS/MB/RS232.Rs232Mode=1
< pw●/SYS/MB/RS232.Rs232Mode=1
```

Error response format:

If there were errors during setting a property, an error message follows the unmodified property value.

pE●[nodePath].[propertyName]=[umodifiedValue]●%EXXX:Error message

Legend:

XXX: error number.

Examples:

```
> SET●/SYS/MB/RS232.Rs232Mode=11
< pE●/SYS/MB/RS232.Rs232Mode %E005:Invalid value
```

```
> SET●/SYS/MB/RS232/Local.ActiveProtocol=LW3
< pE●%E004:Writing read-only property
```

8.3.3. Invocation

A method can be invoked with the help of the 'CALL' command.

Command format: CALL●[nodePath]:[methodName]([parameter])

Response format:

The response for a method execution is a state and a value. The state is mandatory and always defined, if the method could be executed. It can be either a success or a failure. The value is optional and it can contain additional information, such as the reason why the state is a failure or a specific value when the state is success that the client can process. It is also possible to get an error message, when the method could not be executed – e.g. the parameter was illegal - and hence not even the state of the execution could be specified.

mX●[nodePath]:[methodName]=Y

Legend: X can be:

'O': if the execution is successful.

'F': if the execution is failed, but the method could be executed.

'E': if the method could not be executed: e.g. illegal parameter count.

Y can be:

- The return value of the method if any.
- It is valid that a method does not have any return value. In this case the equal sign ('=') can be omitted.

Example:

```
> CALL●/EDID:switch(F48:E1)
< mO●/EDID:switch
```

Error response format:

If there were errors during the execution, an error message is received, which follows the method name.

mE●[nodePath]:[methodName]●%EXXX:Error message

Example:

```
> CALL●/EDID:switch(F48:R1)
< mE●%E001:Syntax error
```

8.3.4. Manual

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

Command format:

for nodes: MAN●[nodePath]

for property: MAN●[nodePath].[propertyName]

for method: MAN●[nodePath]:[methodName]

Response format:

The human readable manual is separated by a space (' ') character from the primitives.

for nodes: nm●[nodePath]●Human readable manual

for properties: pm●[nodePath].[propertyName]●Human readable manual

for methods: mm●[nodePath]:[methodName]●Human readable manual

Example: (for a property)

```
> MAN●/SYS/MB/RS232/Local.ActiveProtocol
< pm●/SYS/MB/RS232/Local.ActiveProtocol ["LW2" | "LW3"]
Active Protocol
```

Example: (for a method)

```
> MAN●/SYS/MB/RS232/Local:factoryDefaults
< mm●/SYS/MB/RS232/Local:factoryDefaults [] Restore factory
default settings
```

8.3.5. Signature

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

The signature is a four digit long hexadecimal value that can be optionally placed before every command. In that case, the response to that particular command will also be preceded by the signature, and the corresponding lines will be between brackets.

Command format: XXXX#[command]

Legend: xxxx: 4-digit long hexadecimal value.

Response format:

{XXXX

[command lines]

}

Legend: xxxx: 4-digit long hexadecimal value.

Example:

```
> 1103#GET●/MEDIA/UART.*
< {1103
< pr●/MEDIA/UART.SublayerCount=1
< pr●/MEDIA/UART.PortCount=2
< pr●/MEDIA/UART.PortMap=P401;P401
< pr●/MEDIA/UART.PortStatus=0000;0000
< pr●/MEDIA/UART.ActiveSublayerMask=300;300
< pr●/MEDIA/UART.P1=Local
< pr●/MEDIA/UART.P2=Link
< }
```

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

8.3.6. Subscription

A user can subscribe to any node. Subscribe to a node means that the user will get a notification if any of the properties of the node is changed. These notifications are asynchronous messages - such as the ones described above - and hence 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.

Info: The subscriptions are handled separately for connections and not to users. 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

Command format: OPEN●[nodePath]

Response format: o-●[nodePath]

Example:

```
> OPEN●/MEDIA/VIDEO
< o-●/MEDIA/VIDEO
```

Subscribe to multiple nodes

In order to subscribe to multiple nodes, the asterisk wildchar can be used.

Command format: OPEN●[nodePath]/*

Response format: o-●[nodePath]/*

Example:

```
> OPEN●/MEDIA/VIDEO/*
< o-●/MEDIA/VIDEO/*
```

Get the active subscriptions

Issuing an ‘OPEN’ command without any parameters returns the active subscriptions for the current connection.

Command format: OPEN

Response format: o-●[nodePath]

Example:

```
> OPEN
< o-●/MEDIA/VIDEO
< o-●/EDID
< o-●/LOG
```

Unsubscribe from a node

Command format: CLOSE●[nodePath]

Response format: c-●[nodePath]

Example:

```
> CLOSE●/MEDIA/VIDEO
< c-●/MEDIA/VIDEO
```

Unsubscribe from multiple nodes

In order to unsubscribe to multiple nodes, the asterisk wildchar can be used.

Command format: CLOSE●[nodePath]/*

Response format: c-●[nodePath]/*

Example:

```
> CLOSE●/MEDIA/VIDEO/*
< c-●/MEDIA/VIDEO/*
```

8.3.7. Notifications about the changes of the properties

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

Format: CHG●[nodePath].[propertyName]=[newPropertyValue]

Example:

```
< CHG /EDID.EdidStatus=F48:E1;F49:E2;F48:E3;F48:E4;F48:E5
```

A short example of how to use the subscription

In the following, an example is presented, how the subscriptions are working and how to use them. In the example 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.

CONNECTION #1	> OPEN●/MEDIA/VIDEO/XP1 < o-●/MEDIA/VIDEO/XP1 > GET●/MEDIA/VIDEO/XP1.DestinationConnectionList < pr●/MEDIA/VIDEO/XP1.DestinationConnectionList=P1:P7
CONNECTION #2	> GET●/MEDIA/VIDEO/XP1.DestinationConnectionList < pr●/MEDIA/VIDEO/XP1.DestinationConnectionList=P1:P7 > CALL●/MEDIA/VIDEO/XP1:switch(P4:P7) < mO●/MEDIA/VIDEO/XP1:switch
CONNECTION #1	< CHG●/MEDIA/VIDEO/XP1.DestinationConnectionList=P4:P7

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

8.3.8. Formal definitions

Method parameters and property values are specified in a modified version of Backus Naur Form (BNF). The syntax is the following:

`"literal"`	literals are quoted
`<expression1> | <expression2>`	vertical bars denote alternatives
`[ <expression> ]`	expressions in square brackets are optional
`<number>*[ <expression> ]`	expression is repeated at least <number> times
`*[ <expression> ]`	<number> may be omitted, in this case number defaults to 0
`<number>*{ <expression> }`	expressions in curly brackets are repeated exactly <number> times

8.4. Media layer properties

8.4.1. SublayerCount

The total number of sublayers on each layer. The layers can be divided to sublayers, which have separate crosspoints. If an input port and an output port belong to different sublayers, they are unable to be connected. For this product all the layers contain only one sublayer.

8.4.2. PortCount

The total number of input and output ports on the actual layer. E.g. UMX-TPS-TX140 video layer contains 6 ports: VGA input, HDMI input, DP input, DVI-D input, DVI-A input, TPS output.

8.4.3. PortMap

Each port is described by 4 characters in this property, these are separated by semicolons. The first character is “I” or “O” depending on the direction of the port (input or output). The other 3 character is a decimal number, which identifies the type of the connector displayed in the Control Software (HDMI, DVI, DP, etc…).

Example: /MEDIA/VIDEO.PortMap=I002;I003;O901

8.4.4. ActiveSublayerMask

Each port is described by 3 characters in this property, these are separated by semicolons:

Value	1st character	2nd character	3rd character
0	-	reserved	No sublayer
1	The port belongs to the video layer		The port is active on sublayer #1
2	The port belongs to the audio layer		The port is active on sublayer #2

Example: /MEDIA/VIDEO.ActiveSublayerMask=101;101;101;101;101;101;101

8.4.5. P1-P7 – port numbers

Name of the ports belong to the layer. See more information in section 11.5 on page 123.

8.5. Video port and crosspoint settings

Info: Port numbers are device-dependent, see more details in section 11.5 on page 123.

8.5.1. Query the video crosspoint setting

Command format: GET●/MEDIA/VIDEO/XP1.DestinationConnectionList

Response format: pr●/MEDIA/VIDEO/XP1.DestinationConnectionList=<input>:<output>

Legend: <input>: Video input port number

<output>: Video output port number

Example:

```
> GET●/MEDIA/VIDEO/XP1.DestinationConnectionList
< pr●/MEDIA/VIDEO/XP1.DestinationConnectionList=P4:P7
```

Explanation: DVI-D input port (P4) is on the output port (TPS) of the transmitter.

8.5.2. Query the status of source ports

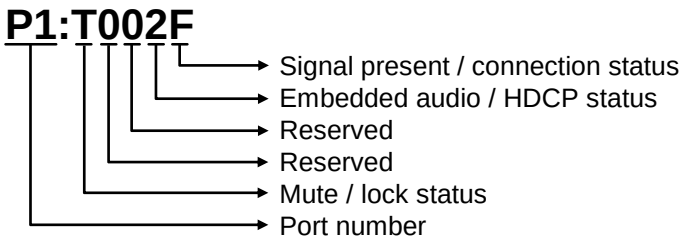
Command format: GET●/MEDIA/VIDEO/XP1.SourcePortStatus

Response format: pr●/MEDIA/VIDEO/XP1.SourcePortStatus=[<port#1>:<status>; <port#2>:<status>;…;<port#n>:<status>]

Example:

```
> GET●/MEDIA/VIDEO/XP1.SourcePortStatus
< pr●/MEDIA/VIDEO/XP1.SourcePortStatus= P1:T002F;P2:T0008;
  P3:T000A;P4:T000A;P5:T000A;P6:T002E
```

Legend



Mute / lock state

T: unlocked, unmuted

L: locked, unmuted

M: unlocked, muted

U: locked, muted

Status bits

	T002F							
HEX	**0**		**0**		**2**		**F**	
BIN	00	00	00	00	00	10	11	11
00	*reserved*				**unknown**	unknown	unknown	unknown
01					*reserved*			
10					emb. audio no present	**not HDCP-encrypted**	signal not present	not connected
11					embedded audio present	HDCP-encrypted	**signal present**	**connected**

Explanation: Video signal is connected to Port # 1, the signal is present and not HDCP-encrypted. The port is unlocked, unmuted.

8.5.3. Switching video input

Command format: CALL●/MEDIA/VIDEO/XP1:switch(<input>:<output>)

Response format: mO●/MEDIA/VIDEO/XP1:switch

Legend: <input>: Video input port number

<output>: Video output port number

Example:

```
> CALL●/MEDIA/VIDEO/XP1:switch(P1:P7)
< mO●/MEDIA/VIDEO/XP1:switch
```

Explanation: P1 port has been switched to P7 port of the transmitter.

8.5.4. Query the video Autoselect settings

Command format: GET●/MEDIA/VIDEO/XP1.DestinationPortAutoselect

Response format: pr●/MEDIA/VIDEO/XP1.DestinationPortAutoselect=<output>:<set>

Legend: <output>: Video output port number

<set>	Explanation
1st letter	E: Autoselect is **enabled** D: Autoselect is **disabled**
2nd letter	K: **Keep** the first active video input selected (First detect mode) P: **Priority** detect: always the highest priority active video input will be selected as transmitted video input L: **Last** detect: always the last attached input is switched to the output automatically
3rd letter	M: The output will be disconnected (**muted** screen) B: The crosspoint is not changed (**blank** screen)

Example:

```
> GET●/MEDIA/VIDEO/XP1.DestinationPortAutoselect
< pr●/MEDIA/VIDEO/XP1.DestinationPortAutoselect=P7:DPM
```

Explanation: “DPM” setting means the autoselect is disabled (D); the mode is “priority detect” (P) and the port will be disconnected if a higher priority port becomes active (M).

8.5.5. Change the Autoselect mode

Command format: CALL●/MEDIA/VIDEO/XP1.setDestinationPortAutoselect

Response format: mO●/MEDIA/VIDEO/XP1.setDestinationPortAutoselect=<output>:<set>

Legend: see 8.5.4 on page 92.

Example1:

```
> CALL●/MEDIA/VIDEO/XP1:setDestinationPortAutoselect(P7:EPM)
< mO●/MEDIA/VIDEO/XP1:setDestinationPortAutoselect
```

Explanation: The setting is “EPM”: Autoselect is enabled (E); the mode is set to “priority detect” (P), and the port will be disconnected if a higher priority port becomes active (M).

Example2:

```
> CALL●/MEDIA/VIDEO/XP1:setDestinationPortAutoselect(P7:D)
< mO●/MEDIA/VIDEO/XP1.setDestinationPortAutoselect
```

Explanation: The setting is changed to “DPM”: Autoselect is disabled (D). The other settings remain unchanged.

8.5.6. Query the input port priority

Command format: GET●/MEDIA/VIDEO/XP1.SourcePortPriority

Response format: pr●/MEDIA/VIDEO/XP1.SourcePortPrioirty=(<port>:<prio>; <port>:<prio>; <port>:<prio>;<port>:<prio>;<port>:<prio>; <port>:<prio>)

Legend: <port>: Input port number

<prio>: Priority number from 0 to 31 (31 means that the port will be skipped from the priority list).

Example:

```
> GET●/MEDIA/VIDEO/XP1.SourcePortPriority
< pr●/MEDIA/VIDEO/XP1.SourcePortPriority=P3:0;P2:1;P4:2;P1:3;
  P5:4;P6:5
```

Explanation: The current priority order of the video input ports is the following:

Priority	0	1	2	3	4	5
Video input port	P3	P2	P4	P1	P5	P6

Highest priority is assigned to P3 port.

Info: The same priority number can be set to different input ports. In this case the input port with the lowest port number will have the highest priority. E.g. setting the priority of P2 (HDMI) and P3 (DP) to "0", the HDMI input port will have higher priority since P2 is lower than P3.

8.5.7. Changing the input port priority

Command format: CALL●/MEDIA/VIDEO/XP1:setSourcePortPriority(<port>:<prio>; <port>:<prio>;…;<port>:<prio>)

Response format: mO●/MEDIA/VIDEO/XP1:setSourcePortPrioirty

Legend: <port>: Input port number

<prio>: Priority number from 0 to 31, equal numbers are allowed (31 means that the port will be skipped from the priority list).

Example:

```
> CALL●/MEDIA/VIDEO/XP1:setSourcePortPriority(P1:0;P2:1;P4:2;
  P3:3;P5:4;P6:5)
< mO●/MEDIA/VIDEO/XP1:setSourcePortPriority
```

Explanation: The new priority order of the video input ports is the following:

Priority	0	1	2	3	4	5
Video input port	P1	P2	P4	P3	P5	P6

Highest priority is set to P1 input video port.

Info: The order of the "<port>:<prio>" parameters does not matter.

8.5.8. Mute an input port

Command format: CALL●/MEDIA/VIDEO/XP1:muteSource(<input>)

Response format: mO●/MEDIA/VIDEO/XP1:muteSource

Legend: <input>: Input port number

Example:

```
> CALL●/MEDIA/VIDEO/XP1:muteSource(P1)
< mO●/MEDIA/VIDEO/XP1:muteSource
```

8.5.9. Unmute an input port

Command format: CALL●/MEDIA/VIDEO/XP1:unmuteSource(<input>)

Response format: mO●/MEDIA/VIDEO/XP1:unmuteSource

Legend: <input>: Input port number

Example:

```
> CALL●/MEDIA/VIDEO/XP1:unmuteSource(P1)
< mO●/MEDIA/VIDEO/XP1:unmuteSource
```

8.5.10. Lock an input port

Command format: CALL●/MEDIA/VIDEO/XP1:lockSource(<input>)

Response format: mO●/MEDIA/VIDEO/XP1:lockSource

Legend: <input>: Input port number

Example:

```
> CALL●/MEDIA/VIDEO/XP1:lockSource(P1)
< mO●/MEDIA/VIDEO/XP1:lockSource
```

8.5.11. Unlock an input port

Command format: CALL●/MEDIA/VIDEO/XP1:unlockSource(<input>)

Response format: mO●/MEDIA/VIDEO/XP1:unlockSource

Legend: <input>: Input port number

Example:

```
> CALL●/MEDIA/VIDEO/XP1:unlockSource(P1)
< mO●/MEDIA/VIDEO/XP1:unlockSource
```

8.5.12. Mute the output

Command format: CALL●/MEDIA/VIDEO/XP1:muteDestination(<output>)

Response format: mO●/MEDIA/VIDEO/XP1:muteDestination

Legend: <output>: Output port number

Example:

```
> CALL●/MEDIA/VIDEO/XP1:muteDestination(P7)
< mO●/MEDIA/VIDEO/XP1:muteDestination
```

8.5.13. Unmute the output

Command format: CALL●/MEDIA/VIDEO/XP1:unmuteDestination(<output>)

Response format: mO●/MEDIA/VIDEO/XP1:unmuteDestination

Legend: <output>: Output port number

Example:

```
> CALL●/MEDIA/VIDEO/XP1:unmuteDestination(P7)
< mO●/MEDIA/VIDEO/XP1:unmuteDestination
```

8.5.14. Lock the output

Command format: CALL●/MEDIA/VIDEO/XP1:lockDestination(<output>)

Response format: mO●/MEDIA/VIDEO/XP1:lockDestination

Legend: <output>: Output port number

Example:

```
> CALL●/MEDIA/VIDEO/XP1:lockDestination(P7)
< mO●/MEDIA/VIDEO/XP1:lockDestination
```

Explanation: P7 port is locked.

8.5.15. Unlock the output

Command format: CALL●/MEDIA/VIDEO/XP1:unlockDestination(<output>)

Response format: mO●/MEDIA/VIDEO/XP1:unlockDestination

Legend: <output>: Output port number

Example:

```
> CALL●/MEDIA/VIDEO/XP1:unlockDestination(P7)
< mO●/MEDIA/VIDEO/XP1:unlockDestination
```

Explanation: P7 port is unlocked.

8.6. Audio port and crosspoint settings

Info: Port numbers are device-dependent, see more details in section 11.5 on page 123.

8.6.1. Query the audio crosspoint setting

Command format: GET●/MEDIA/AUDIO/XP1.DestinationConnectionList

Response format: pr●/MEDIA/AUDIO/XP1.DestinationConnectionList=<input>:<output>

Legend: <input>: Audio input port number

<output>: Audio output port number

Example:

```
> GET●/MEDIA/AUDIO/XP1.DestinationConnectionList
< pr●/MEDIA/AUDIO/XP1.DestinationConnectionList=P1:P6
```

Explanation: P1 input is connected to P6 (P1 is Audio 1, P6 is the audio output on TX140).

8.6.2. Switching audio input

Command format: CALL●/MEDIA/AUDIO/XP1:switch(<input>:<output>)

Response format: mO●/MEDIA/AUDIO/XP1:switch

Legend: <input>: Audio input port number

<output>: Audio output port number

Example:

```
> CALL●/MEDIA/AUDIO/XP1:switch(P1:P6)
< mO●/MEDIA/AUDIO/XP1:switch
```

Explanation: Audio1 input port (P1) is switched to the output port (TPS) of the transmitter.

8.6.3. Query the audio Autoselect setting

Command format: GET●/MEDIA/AUDIO/XP1.DestinationPortAutoselect

Response format: pr●/MEDIA/ AUDIO /XP1.DestinationPortAutoselect=<output>:<set>

Legend: <output>: Audio output port number

<set>: Autoselect setting, described by a three-letter-code:

<set>	Explanation
1st letter	E: Autoselect is **enabled** D: Autoselect is **disabled**
2nd letter	K: **Keep** the first active video input selected (First detect mode) P: **Priority** detect: always the highest priority active video input will be selected as transmitted video input L: **Last** detect: always the last attached input is switched to the output automatically S: **Static**: audio and video input ports are assigned to each other as a fixed setting (see section 5.3.5 on page 35).
3rd letter	M: The output will be disconnected (**muted** screen) B: The crosspoint is not changed (**blank** screen)

Example:

```
> GET●/MEDIA/AUDIO/XP1.DestinationPortAutoselect
< pr●/MEDIA/AUDIO/XP1.DestinationPortAutoselect=P7:DPM
```

Explanation: The setting is “DPM”: Autoselect is disabled (D); the mode is set to “priority detect” (P), and the port will be disconnected if a higher priority port becomes active (M).

8.6.4. Change the audio Autoselect setting

Command format: CALL●/MEDIA/AUDIO/XP1.setDestinationPortAutoselect

Response format: mO●/MEDIA/AUDIO/XP1.setDestinationPortAutoselect=
<output>:<set>

Legend: see 8.6.3 on page 96.

Example1:

```
> CALL●/MEDIA/AUDIO/XP1:setDestinationPortAutoselect(P7:EPM)
< mO●/MEDIA/AUDIO/XP1:setDestinationPortAutoselect
```

Explanation: The setting is changed to “EPM”: Autoselect is enabled (E); the mode is set to “priority detect” (P), and the port will be disconnected if a higher priority port becomes active (M).

Example2:

```
> CALL●/MEDIA/AUDIO/XP1:setDestinationPortAutoselect(P7:D)
< mO●/MEDIA/AUDIO/XP1.setDestinationPortAutoselect
```

Explanation: The setting is changed to “DPM”: Autoselect is disabled (D). The other settings remain unchanged.

8.7. RS-232 port configuration

Info: There are two nodes under /SYS/RS232 node, 'Link' and 'Local'. 'Link' is the serial line of TPS output, 'Local' is the serial line of the Phoenix connector.

8.7.1. Protocol setting

Command format: SET●/SYS/MB/RS232/{Local|Link}.ControlProtocol={0|1}

Response format: pw●/SYS/MB/RS232/{Local|Link}.ControlProtocol={0|1}

Example:

```
> SET●/SYS/MB/RS232/Local.ControlProtocol=1
< pw●/SYS/MB/RS232/Local.ControlProtocol=1
```

Parameters:

.ControlProtocol	Protocol
0	LW2
1	LW3

Info: This read-only property shows the actual control protocol. For the local port it always follows the ControlProtocol property, but it is not the same for the link RS-232 port. If the device is connected to an MX-TPS-IB board, the ActiveProtocol is always LW2 on the link RS-232 port, LW3 is not supported through the link in this case. Besides the port settings (Baud rate, databits, stop bits, parity) are ignored, since the followings pre-defined values are valid: 115200, 8N1. The user can set the ControlProtocol to LW3, but this setting will take effect only after connecting UMX-TPS to a TPS-RX-90/95 receiver.

8.7.2. BAUD rate setting

Command format: SET●/SYS/MB/RS232/{Local|Link}.Baudrate={0|1|2|3|4|5|6|7}

Response format: pw●/SYS/MB/RS232/{Local|Link}.Baudrate={0|1|2|3|4|5|6|7}

Example:

```
> SET●/SYS/MB/RS232/Local.Baudrate=2
< pw●/SYS/MB/RS232/Local.Baudrate=2
```

Parameters:

.Baudrate	0	1	2	3	4	5	6	7
BAUD rate value	4800	7200	9600	14400	19200	38400	57600	115200

Explanation: The BAUD rate in the node 'Local' is set to 9600.

Info: The same BAUD rate is recommended to set on both sides. Please consider the possible overflow when the difference is too big between the set BAUD rates.

Info: If the device is connected to an MX-TPS-IB, the port settings (Baud rate, databits, stop bits, parity) are ignored, since the followings pre-defined values are valid: 115200 8N1.

8.7.3. Databit setting

Command format: SET●/SYS/MB/RS232/{Local|Link}.DataBits={8|9}

Response format: pw●/SYS/MB/RS232/{Local|Link}.DataBits={8|9}

Example:

```
> SET●/SYS/MB/RS232/Local.DataBits=8
< pw●/SYS/MB/RS232/Local.DataBits=8
```

Parameters:

.DataBits	Data bits value
8	8
9	9

8.7.4. Stopbits setting

Command format: SET●/SYS/MB/RS232/{Local|Link}.StopBits={0|1|2}

Response format: pw●/SYS/MB/RS232/{Local|Link}.StopBits={0|1|2}

Example:

```
> SET●/SYS/MB/RS232/Local.StopBits=0
< pw●/SYS/MB/RS232/Local.StopBits=0
```

Parameters:

.StopBits	Stopbit value
0	1
1	1,5
2	2

8.7.5. Parity setting

Command format: SET●/SYS/MB/RS232/{Local|Link}.Parity={0|1|2}

Response format: pw●/SYS/MB/RS232/{Local|Link}.Parity={0|1|2}

Example:

```
> SET●/SYS/MB/RS232/Local.Parity=0
< pw●/SYS/MB/RS232/Local.Parity=0
```

Parameters:

.Parity	Parity setting
0	no parity
1	odd
2	even

8.7.6. RS232 operation mode

Command format: SET●/SYS/MB/RS232.Rs232Mode={0|1|2}

Response format: pw●/SYS/MB/RS232.Rs232Mode={0|1|2}

Example:

```
> SET●/SYS/MB/RS232.Rs232Mode=1
< pw●/SYS/MB/RS232.Rs232Mode=1
```

Parameters:

.Rs232Mode	RS-232 operation mode
0	Pass-through
1	Control
2	Command injection

8.8. Network configuration

Info: The transmitter needs to be restarted to apply changes after modification.

8.8.1. Query the DHCP state

Command format: GET●/MANAGEMENT/NETWORK.DhcpEnabled

Response format: pw●/MANAGEMENT/NETWORK.DhcpEnabled={true|false}

Example:

```
> GET●/MANAGEMENT/NETWORK.DhcpEnabled
< pw●/MANAGEMENT/NETWORK.DhcpEnabled=true
```

8.8.2. Change the DHCP state

Command format: SET●/MANAGEMENT/NETWORK.DhcpEnabled={true|false}

Response format: pw●/MANAGEMENT/NETWORK.DhcpEnabled={true|false}

Example:

```
> SET●/MANAGEMENT/NETWORK.DhcpEnabled=false
< pw●/MANAGEMENT/NETWORK.DhcpEnabled=false
```

8.8.3. Query the IP address

Command format: GET●/MANAGEMENT/NETWORK.IpAddress

Response format: pr●/MANAGEMENT/NETWORK.IpAddress=<IP_address>

Example:

```
> GET●/MANAGEMENT/NETWORK.IpAddress
< pr●/MANAGEMENT/NETWORK.IpAddress=192.168.0.102
```

8.8.4. Change the IP address (static)

Command format: SET●/MANAGEMENT/NETWORK.StaticIpAddress=<IP_address>

Response format: pw●/MANAGEMENT/NETWORK.StaticIpAddress=<IP_address>

Example:

```
> SET●/MANAGEMENT/NETWORK.StaticIpAddress=192.168.0.105
< pw●/MANAGEMENT/NETWORK.StaticIpAddress=192.168.0.105
```

8.8.5. Query the subnet mask

Command format: GET●/MANAGEMENT/NETWORK.NetworkMask

Response format: pr●/MANAGEMENT/NETWORK.NetworkMask=<netmask>

Example:

```
> GET●/MANAGEMENT/NETWORK.NetworkMask
< pr●/MANAGEMENT/NETWORK.NetworkMask=255.255.255.0
```

8.8.6. Change the subnet mask (static)

Command format: SET●/MANAGEMENT/NETWORK.StaticNetworkMask=<netmask>

Response format: pw●/MANAGEMENT/NETWORK.StaticNetworkMask=<netmask>

Example:

```
> SET●/MANAGEMENT/NETWORK.StaticNetworkMask=255.255.255.0
< pw●/MANAGEMENT/NETWORK.StaticNetworkMask=255.255.255.0
```

Info: Device needs to be restarted to apply changes.

8.8.7. Query the gateway address

Command format: GET●/MANAGEMENT/NETWORK.GatewayAddress

Response format: pr●/MANAGEMENT/NETWORK.GatewayAddress=<gw_address>

Example:

```
> GET●/MANAGEMENT/NETWORK.GatewayAddress
< pr●/MANAGEMENT/NETWORK.GatewayAddress=192.168.0.1
```

8.8.8. Change the gateway address (static)

Command format: SET●/MANAGEMENT/NETWORK.StaticGatewayAddress=<gw_address>

Response format: pr●/MANAGEMENT/NETWORK.StaticGatewayAddress=<gw_address>

Example:

```
> SET●/MANAGEMENT/NETWORK.StaticGatewayAddress=192.168.0.5
< pw●/MANAGEMENT/NETWORK.StaticGatewayAddress=192.168.0.5
```

8.9. GPIO settings

8.9.1. Set the direction of a GPIO pin

Command format: SET●/MEDIA/GPIO/P<pin_#>.Direction=<dir>

Response format: pw●/MEDIA/GPIO/ P<pin_#>.Direction=<dir>

Legend: <pin#>: number of the GPIO pin

<dir>: direction of the GPIO pin: I=input; O=output

Example:

```
> SET●/MEDIA/GPIO/P1.Direction=I
< pw●/MEDIA/GPIO/P1.Direction=I
```

Info: Use the GET command to query the parameter.

8.9.2. Set the output value of a GPIO pin

Command format: SET●/MEDIA/GPIO/P<pin_#>.Output=<value>

Response format: pw●/MEDIA/GPIO/ P<pin_#>.Output=<value>

Legend: <pin#>: number of the GPIO pin

<value>: value of the GPIO pin: H=high level; O=low level

Example:

```
> GET●/MEDIA/GPIO/P1.Output
< pw●/MEDIA/GPIO/P1.Output=H
```

Explanation: Output level of GPIO pin1 is high.

8.9.3. Toggle the value of a GPIO pin

Command format: CALL●/MEDIA/GPIO/P<pin_#>:toggle(1)

Response format: mO●/MEDIA/GPIO/ P<pin_#>:toggle

Legend: <pin#>: number of the GPIO pin

Example:

```
> CALL●/MEDIA/GPIO/P1:toggle(1)
< mO●/MEDIA/GPIO/P1:toggle
```

Explanation: If the direction of the pin is input: the output value is toggled.

If the direction of the pin is output: the output value and the input value are toggled.

8.10. Event settings (conditions and actions)

20 events can be configured in the transmitter, these nodes are located under /EVENTS. More details can be found in section 6.9 on page 55.

To describe the process of setting an event by protocol commands, a simple example will used. The event will be set under the /EVENTS/E1 node and will contain the following setting:

If signal is present on input port P1, the value of GPIO1 pin will be set to High.

The setting is stored in 6 different properties which are described in the followings.

8.10.1. Set the source node (condition)

Command format: SET●/EVENTS/E<event_nr>.SourceNode=<node_path>"/"<node_name>

Response format: pw●/EVENTS/E<event_nr>.SourceNode=<node_path>"/"<node_name>

Example:

```
> SET●/EVENTS/E1.SourceNode=/MEDIA/VIDEO/P1
< pw●/EVENTS/E1.SourceNode=/MEDIA/VIDEO/P1
```

Explanation: This node contains the path of the property that will fire the E1 event (the path of the P1 video input port).

Info: Node path must be started with "/".

8.10.2. Set the source property (condition)

Command format: SET●/EVENTS/E<event_nr>.SourceProperty=<property>

Response format: pw●/EVENTS/E<event_nr>.SourceProperty=<property>

Example:

```
> SET●/EVENTS/E1.SourceProperty=SignalPresent
< pw●/EVENTS/E1.SourceProperty=SignalPresent
```

Explanation: This node contains the property that will fire the E1 event (signal present state of P1 port).

8.10.3. Set the value of the source property (condition)

Command format: SET●/EVENTS/E<event_nr>.SourcePropertyValue=<value>

Response format: pw●/EVENTS/E<event_nr>.SourcePropertyValue=<value>

Example:

```
> SET●/EVENTS/E1.SourcePropertyValue=1
< pw●/EVENTS/E1.SourcePropertyValue=1
```

Explanation: The E1 event will be fired, if this property is changed to the set value (signal is present on input port P1).

8.10.4. Set the target node (action)

Command format: SET●/EVENTS/E<event_nr>.TargetNode=<node_path>"/"<node_name>

Response format: pw●/EVENTS/E<event_nr>.TargetNode=<node_path>"/"<node_name>

Example:

```
> SET●/EVENTS/E1.TargetNode=/MEDIA/GPIO/P1
< pw●/EVENTS/E1.TargetNode=/MEDIA/GPIO/P1
```

Explanation: This node contains the path of the property that will be changed after the E1 event is fired.

Info: Node path must be started with "/".

8.10.5. Set the target property (action)

Command format: SET●/EVENTS/E<event_nr>.TargetProperty=<property>

Response format: pw●/EVENTS/E<event_nr>.TargetProperty=<property>

Example:

```
> SET●/EVENTS/E1.TargetProperty=Output
< pw●/EVENTS/E1.TargetProperty=Output
```

Explanation: The node contains the property that will be changed after E1 event is fired.

8.10.6. Set the value of the target property (action)

Command format: SET●/EVENTS/E<event_nr>.TargetPropertyValue=<value>

Response format: pw●/EVENTS/E<event_nr>.TargetPropertyValue=<value>

Example:

```
> SET●/EVENTS/E1.TargetPropertyValue=H
< pw●/EVENTS/E1.TargetPropertyValue=H
```

Explanation: If the E1 event is fired, this value will be stored in the set target property.

8.11. EDID management

8.11.1. Query the emulated EDIDs

Command format: GET●/EDID.EdidStatus

Response format: pr●/EDID.EdidStatus([*\{<edid_id>":"<emulated_edid_id>";"\}])

Example:

```
> GET●/EDID.EdidStatus
< pr●/EDID.EdidStatus=F48:E1;F48:E2;F48:E3;F48:E4;F48:E5
```

Explanation: The available video input ports are listed from E1 to E5 and the emulated EDID's number is displayed. E.g. F48 (48th Factory) EDID is emulated on E1 (VGA) input.

8.11.2. Query the validity of a dynamic EDID

Command format: GET●/EDID/D/D1.Validity

Response format: pr●/EDID/D/D1.Validity={true|false}

Example:

```
> GET●/EDID/D/D1.Validity
< pr●/EDID/D/D1.Validity=true
```

Explanation: The 'Validity' property is true, valid EDID is stored in D1 memory place.

8.11.3. Query a user EDID header

Command format: GET●/EDID/U/U1.Header

Response format: pr●/EDID/U/U1.Header={"Invalid"|<edid_header>}

Legend: <edid_header>: ID of manufacturer; preferred timing; monitor name

Example1:

```
> GET●/EDID/U/U1.Header
< pr●/EDID/U/U1.Header=Invalid
```

Explanation1: The memory place U1 does not contain valid EDID.

Example2:

```
> GET●/EDID/U/U2.Header
< pr●/EDID/U/U2.Header=LWR;640x480@60.0Hz;D640x480p60
```

Explanation2: The memory place U2 contains valid EDID.

8.11.4. Emulating an EDID to an input port

Command format: CALL●/EDID:switch(<source>:<destination>)

Response format: mO●/EDID:switch

Example:

```
> CALL●/EDID:switch(F49:E2)
< mO●/EDID:switch
```

Legend: <source>: Source EDID memory places that can be Factory, User or Dynamic EDID memory.

<destination>: The emulated EDID memory of the desired input port.

8.11.5. Copy an EDID to user memory

Command format: CALL●/EDID:copy(<source>:<destination>)

Response format: mO●/EDID:copy

Example:

```
> CALL●/EDID:copy(D1:U1)
< mO●/EDID:copy
```

Legend: <source>: Source EDID memory places that can be Factory, User or Dynamic EDID memory.

<destination>: User EDID memory place (U1…U15).

Explanation: The EDID of the last connected sink (Dynamic EDID, D1) has been copied to the user memory (U1).

8.11.6. Deleting an EDID from user memory

Command format: CALL●/EDID:delete(<user_edid_memory>)

Response format: mO●/EDID:delete

Example:

```
> CALL●/EDID:delete(U1)
< mO●/EDID:delete
```

8.11.7. Resetting emulated EDIDs

Command format: CALL●/EDID:reset(1)

Response format: mO●/EDID:reset

Example:

```
> CALL●/EDID:reset(1)
< mO●/EDID:reset
```

Explanation: Calling this method switches all emulated EDIDs to factory default one. See the table in section 11.5 on page 123.

8.12. LW3 commands – Quick summary

Video port and crosspoint settings

Operation	See in chapter	Path
Query the video crosspoint setting	8.5.1	/MEDIA/VIDEO/XP1.DestinationConnectionList
Query the status of source ports	8.5.2	/MEDIA/VIDEO/XP1.SourcePortStatus
Switching video input	8.5.3	/MEDIA/VIDEO/XP1:switch(<input>:<output>)
Query the video Autoselect settings	8.5.4	/MEDIA/VIDEO/XP1.DestinationPortAutoselect
Change the Autoselect mode	8.5.5	/MEDIA/VIDEO/XP1.setDestinationPortAutoselect
Query the input port priority	8.5.6	/MEDIA/VIDEO/XP1.SourcePortPriority
Changing the input port priority	8.5.7	/MEDIA/VIDEO/XP1:setSourcePortPriority (<port>:<prio>;…;<port>:<prio>)
Mute an input port	8.5.8	/MEDIA/VIDEO/XP1:muteSource(<input>)
Unmute an input port	8.5.9	/MEDIA/VIDEO/XP1:unmuteSource(<input>)
Lock an input port	8.5.10	/MEDIA/VIDEO/XP1:lockSource(<input>)
Unlock an input port	8.5.11	/MEDIA/VIDEO/XP1:unlockSource(<input>)
Mute the output	8.5.12	/MEDIA/VIDEO/XP1:muteDestination(<output>)
Unmute the output	8.5.13	/MEDIA/VIDEO/XP1:unmuteDestination(<output>)
Lock the output	8.5.14	/MEDIA/VIDEO/XP1:lockDestination(<output>)
Unlock the output	8.5.15	/MEDIA/VIDEO/XP1:unlockDestination(<output>)

Audio port and crosspoint settings

Operation	See in chapter	Path
Query the audio crosspoint setting	8.6.1	/MEDIA/AUDIO/XP1.DestinationConnectionList
Switching audio input	8.6.2	/MEDIA/AUDIO/XP1:switch(<input>:<output>)
Query the audio Autoselect setting	8.6.3	/MEDIA/AUDIO/XP1.DestinationPortAutoselect
Change the audio Autoselect setting	8.6.4	/MEDIA/AUDIO/XP1.DestinationPortAutoselect

RS-232 port configuration

Operation	See in chapter	Path
Protocol setting	8.7.1	/SYS/MB/RS232/{Local|Link}.ControlProtocol
BAUD rate setting	8.7.2	/SYS/MB/RS232/{Local|Link}.Baudrate
Databit setting	8.7.3	/SYS/MB/RS232/{Local|Link}.DataBits
Stopbits setting	8.7.4	/SYS/MB/RS232/{Local|Link}.StopBits
Parity setting	8.7.5	/SYS/MB/RS232/{Local|Link}.Parity
RS232 operation mode	8.7.6	/SYS/MB/RS232.Rs232Mode

Network configuration

Operation	See in chapter	Path
Query the DHCP state	8.8.1	/MANAGEMENT/NETWORK.DhcpEnabled
Change the DHCP state	8.8.2	/MANAGEMENT/NETWORK.DhcpEnabled
Query the IP address	8.8.3	/MANAGEMENT/NETWORK.IpAddress
Change the IP address (static)	8.8.4	/MANAGEMENT/NETWORK.StaticIpAddress
Query the subnet mask	8.8.5	MANAGEMENT/NETWORK.NetworkMask
Change the subnet mask (static)	8.8.6	MANAGEMENT/NETWORK.StaticNetworkMask
Query the gateway address	8.8.7	/MANAGEMENT/NETWORK.GatewayAddress
Change the gateway address (static)	8.8.8	MANAGEMENT/NETWORK.StaticGatewayAddress

GPIO settings

Operation	See in chapter	Path
Set the direction of a GPIO pin	8.9.1	/MEDIA/GPIO/P<pin_#>.Direction
Set the output value of a GPIO pin	8.9.2	/MEDIA/GPIO/P<pin_#>.Output
Toggle the value of a GPIO pin	8.9.3	/MEDIA/GPIO/P<pin_#>:toggle

Event settings

Operation	See in chapter	Path
Set the source node (condition)	8.10.1	/EVENTS/E<event_nr>.SourceNode
Set the source property (condition)	8.10.2	/EVENTS/E<event_nr>.SourceProperty
Set the value of the source property (condition)	8.10.3	/EVENTS/E<event_nr>.SourcePropertyValue
Set the target node (action)	8.10.4	/EVENTS/E<event_nr>.TargetNode
Set the target property (action)	8.10.5	/EVENTS/E<event_nr>.TargetProperty
Set the value of the target property (action)	8.10.6	/EVENTS/E<event_nr>.TargetPropertyValue

EDID management

Operation	See in chapter	Path
Query the emulated EDIDs	8.11.1	/EDID.EdidStatus
Query the validity of a dynamic EDID	8.11.2	/EDID/D/D1.Validity
Query a user EDID header	8.11.3	/EDID/U/U1.Header
Emulating an EDID to an input port	8.11.4	/EDID:switch(<source>:<destination>)
Copy an EDID to user memory	8.11.5	/EDID:copy(<source>:<destination>)
Deleting an EDID from user memory	8.11.6	/EDID:delete(<user_edid_memory>)
Resetting emulated EDIDs	8.11.7	/EDID:reset(1)

9. Firmware upgrade – using Lightware Device Updater (LDU)

UMX-TPS transmitters can be upgraded by using Lightware Device Updater (LDU) software. The application can be downloaded from www.lightware.eu. In order to get the firmware pack with the necessary components (*.lfp file) for your specific product, please contact support@lightware.eu.

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

Info: User EDID memory, events or settings are not modified/erased during the upgrade.

9.1. About the firmware package (LFP file)

The firmware files are handled on a different way and the new approach means new features. If a device has to be upgraded, only one file is necessary (LFP file):

- The structure allows to use the same LFP package for different devices (e.g. TPS devices have only one common package).
- The package contains all the necessary components, binary and other files; You do not have to get further files.
- There is a descriptor file in the package that contains:
  - Each firmware with version number,
  - A list showing the compatible devices.

  The descriptor is displayed after loaded the LFP file in the LDU.

9.2. Short instructions

Step 1. Get the firmware pack and the Lightware Device Updater (LDU) application.

Step 2. Install the LDU application.

Step 3. Establish the connection between the computer and the device(s).

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

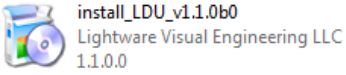
9.3. Installing Lightware Device Updater (LDU)

9.3.1. Windows install

The application can be downloaded from www.lightware.eu.

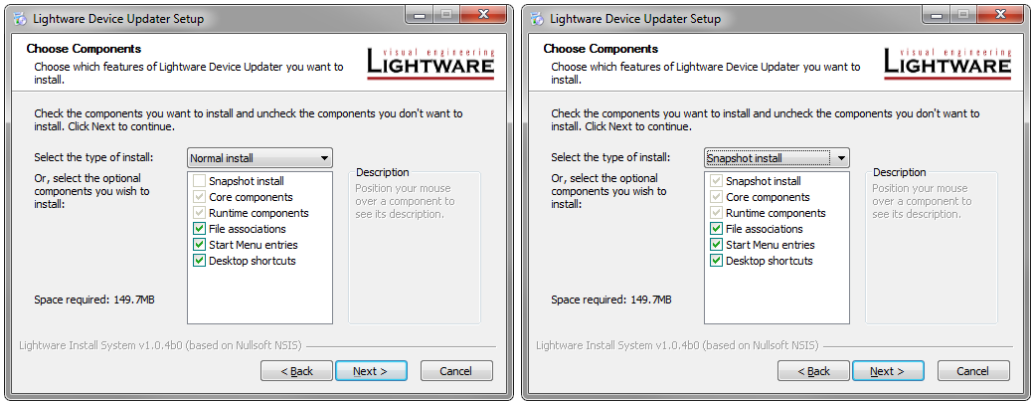
Info: LDU can be installed under Windows XP or above.

Step 1. Run install_LDU_v1.1.0b0.exe.



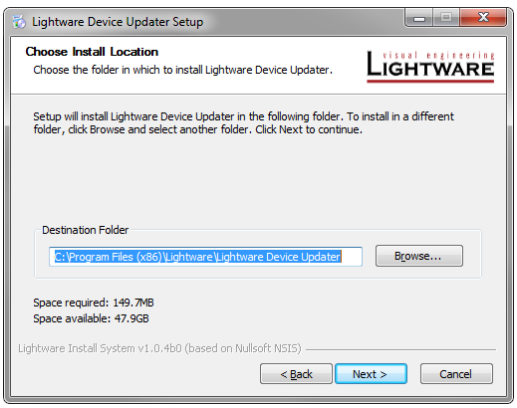
Step 2. Click Next in the opening Welcome window.

Step 3. Select the type of the installation: normal or snapshot install. Select the optional components then click Next. (Using the Normal install as the default value is highly recommended.)

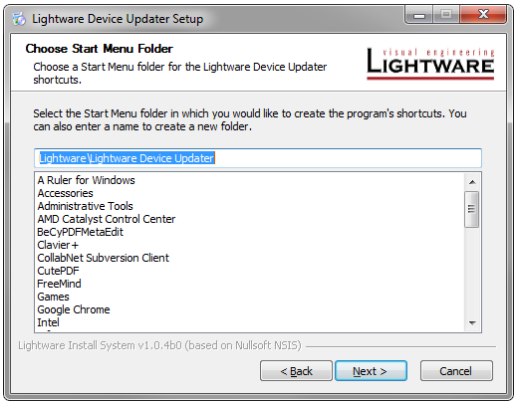


Normal install (recommended)	Snapshot install
The installer can update only this instance.	Cannot be updated.
One only updateable instance can exist for all users.	More than one different version can be installed for all users.
Does not contain the version in its name.	Version number is displayed in the name.

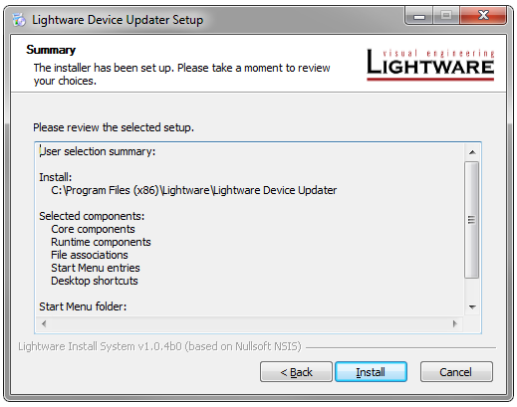
Step 4. Select the destination folder and click Next. (Using the default path is highly recommended.)



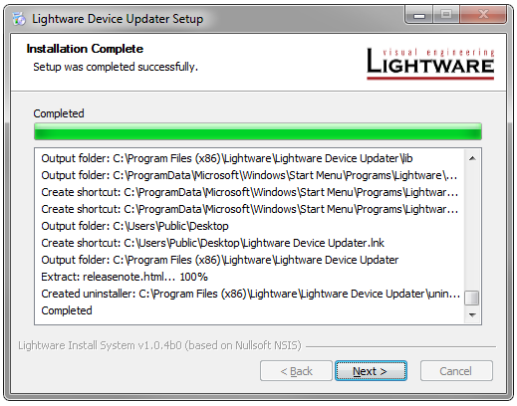
Step 5. Select the Start menu folder and click Next. Using the default folder is highly recommended.



Step 6. Verify the settings and click Install, or click Back and change the settings.



Step 7. After the installation of the last component the Next button is activated – click on it.



Step 8. If the installation is complete, click Finish.

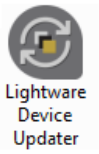
9.3.2. Mac OS X install

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

Step 2. Drag the LDU icon over the Applications icon to copy the program into the Applications folder. If you want to copy the LDU into another location just drag the icon over the desired folder.

Info: This type of the installer is equal with the Normal install (updateable) in case of Windows.

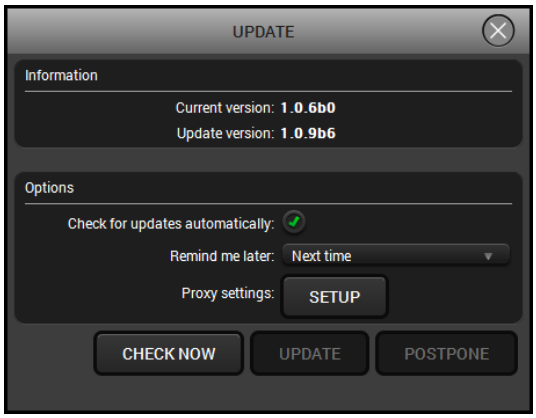
9.3.3. Upgrading the LDU



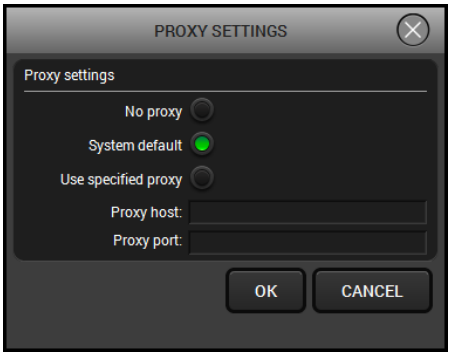
Step 1. Run the application.

Step 2. In the welcome screen click on the ? button in the top right corner; the About window will appear. Click on the Check now button.

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



Click on the Setup button to open the Proxy settings window:



Press the Update button to download the new version; the installer will start.

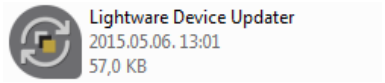
9.4. Detailed instructions

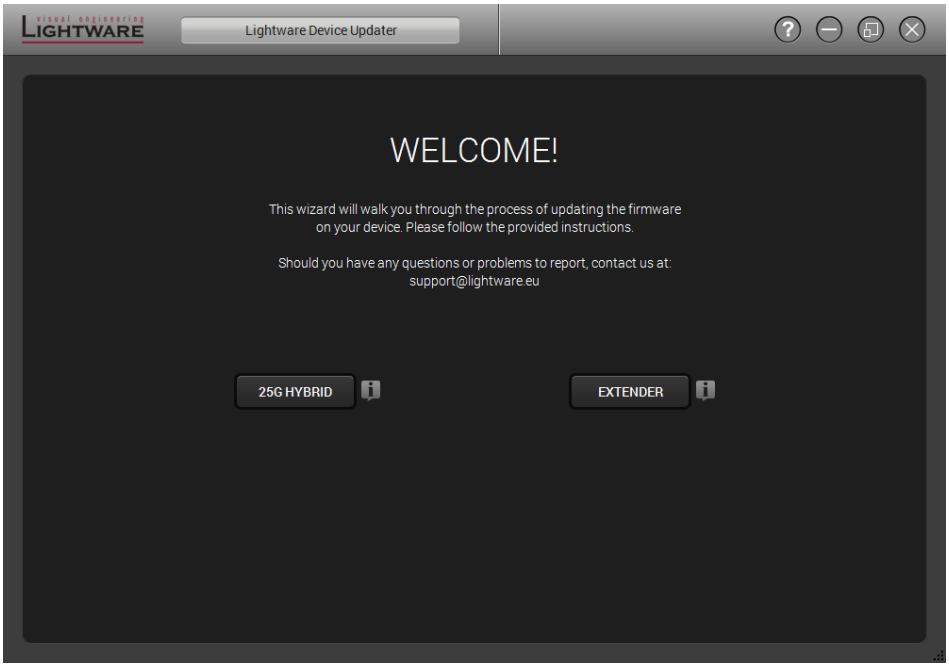
9.4.1. Establish the connection between the computer and the device(s)

Make sure that the computer and the device(s) are connected and the connection is established. If you have a DHCP server on your local network, then it is recommended to switch the device to DHCP mode. If you connect the device directly to the computer, set a fix IP address.

9.4.2. Start the LDU and follow the instructions

The welcome screen will appear:



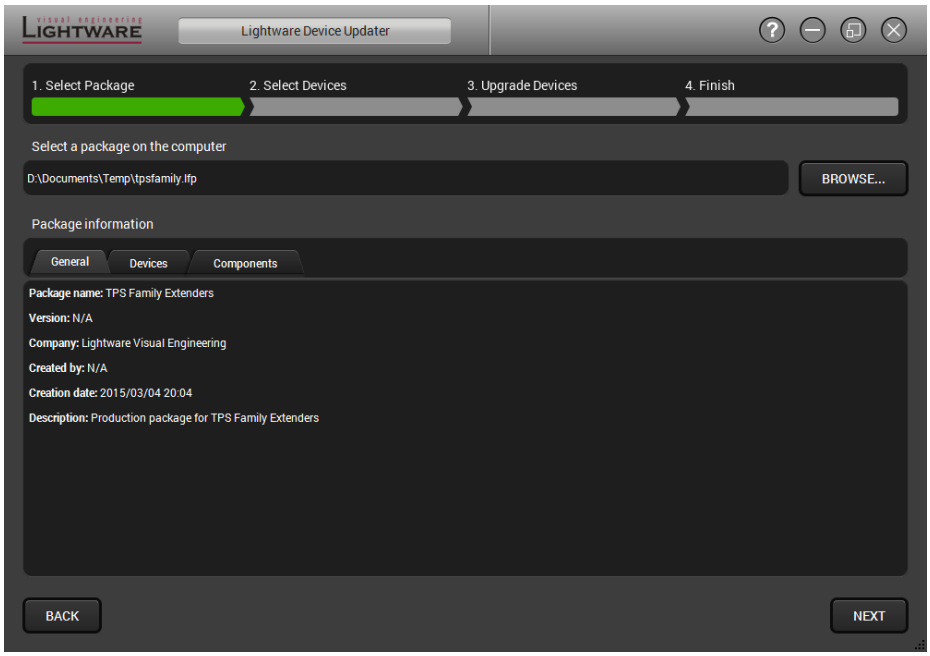


Pressing the button a list will appear showing the supported devices:

Click on the EXTENDER button on the main screen.

Step 1. Select the package.

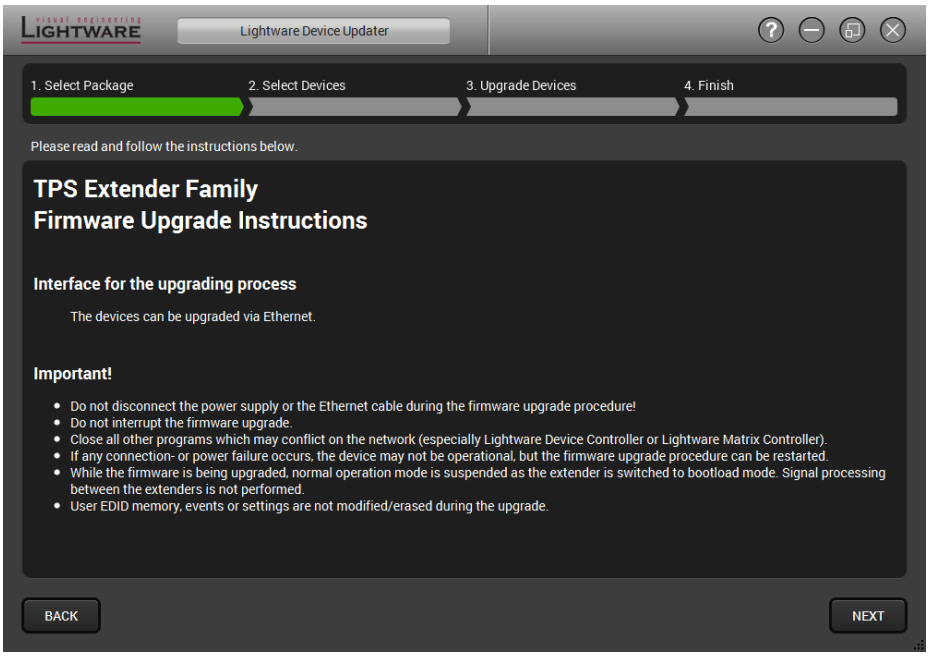
Click on the Browse button and select the ".lfp" file that will be used for the upgrade.



Package information will be loaded to the tabs:

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

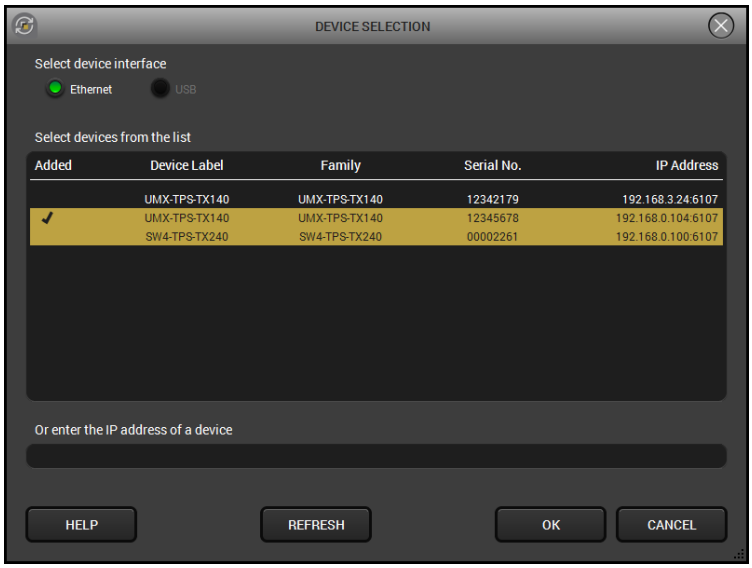
Click on the Next button and follow the instructions.



Info: Files with ".lfp" extension are associated to LDU during installation. If you double click on the ".lfp" file, the application is launched, the package is loaded automatically and above screen is shown.

Click on the Next button to continue.

Step 2. Select devices.

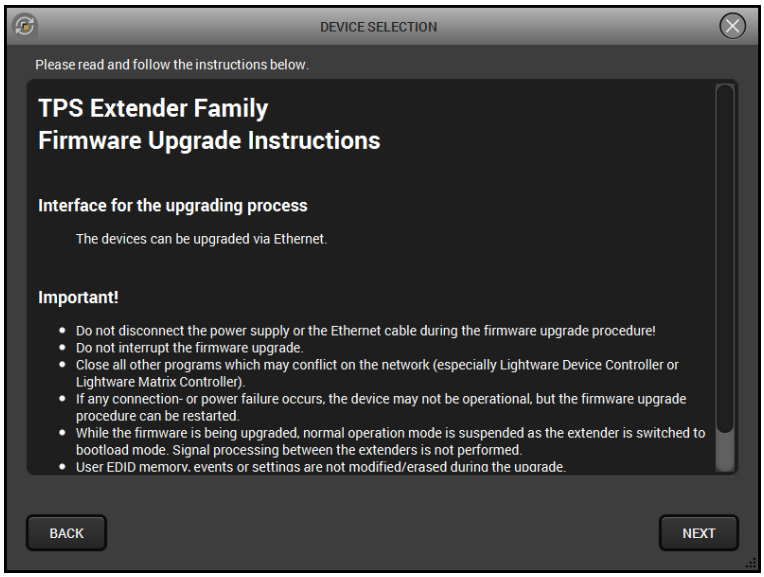


The following step is to select the device(s) which will be updated. The available and supported devices are searched and listed automatically. If the desired device is not listed, update the list by clicking the Refresh button (devices with Ethernet connection: type the IP address in the line). Select the desired devices: highlight them with yellow cursor, then click OK.

A tick mark can be seen in the **Added** column if the device was added by the user previously.

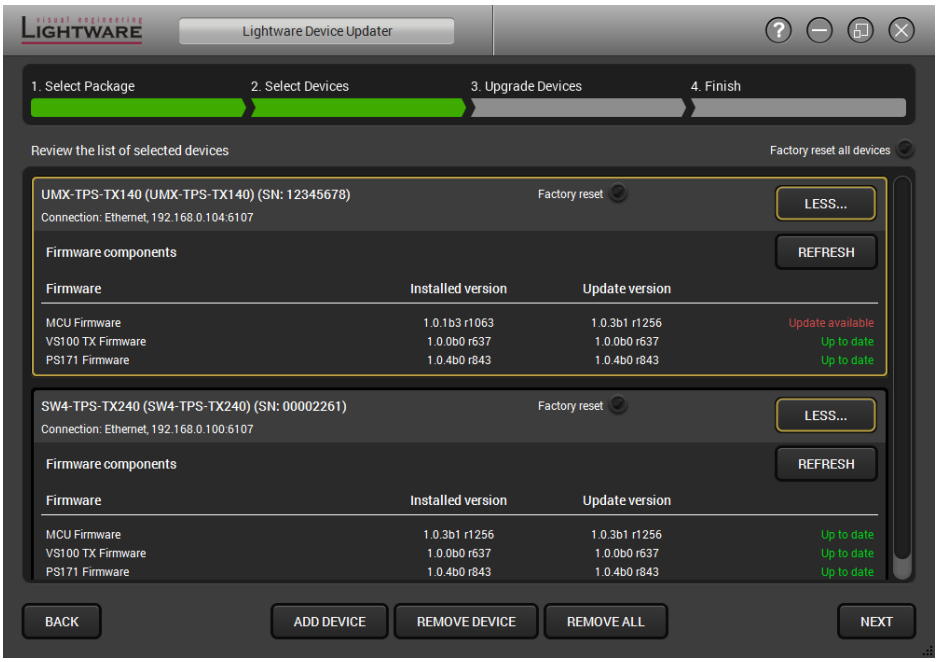
Help window

Device-specific instructions are displayed after clicking the Help button. If any problem occurs, follow the steps described in the Help window.



Firmware components

The firmware components of the selected devices are listed on the following screen: installed and update versions. (Update version will be uploaded to the device.)



Add a device by clicking on the Add device button. The previous screen will be shown; select the desired device(s) and click on OK.

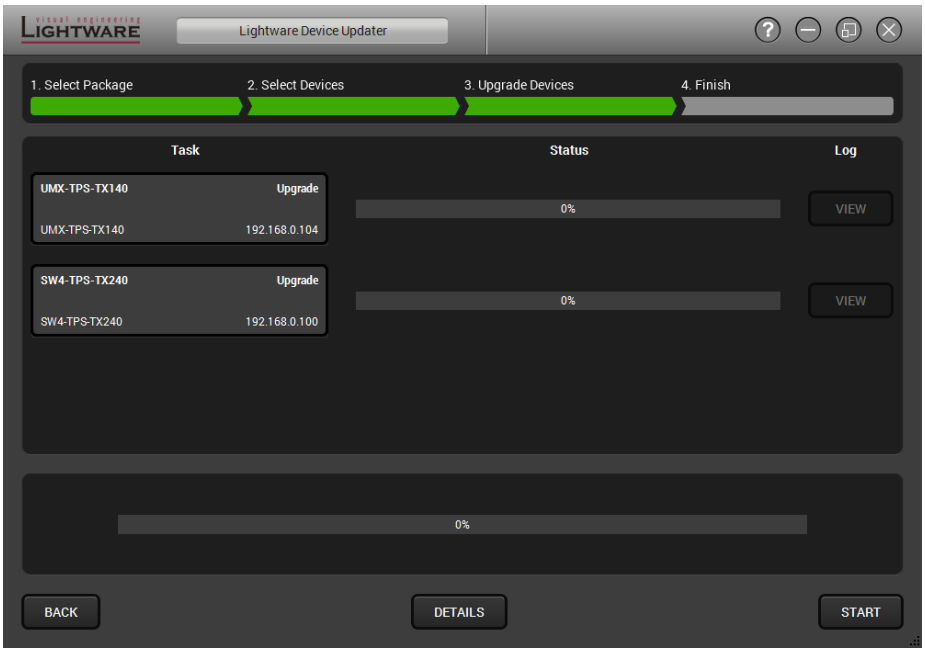
Remove a device by selecting it (highlight with yellow) and click on Remove device button; or click on **Remove all** button to empty the list.

Factory reset can be also executed by ticking the option on the right (device by device or for all). The settings has the same effect as resetting the device manually after the upgrade. In certain cases (if it is a must because of the upgrade) the Factory reset option is automatically marked and cannot be unmarked.

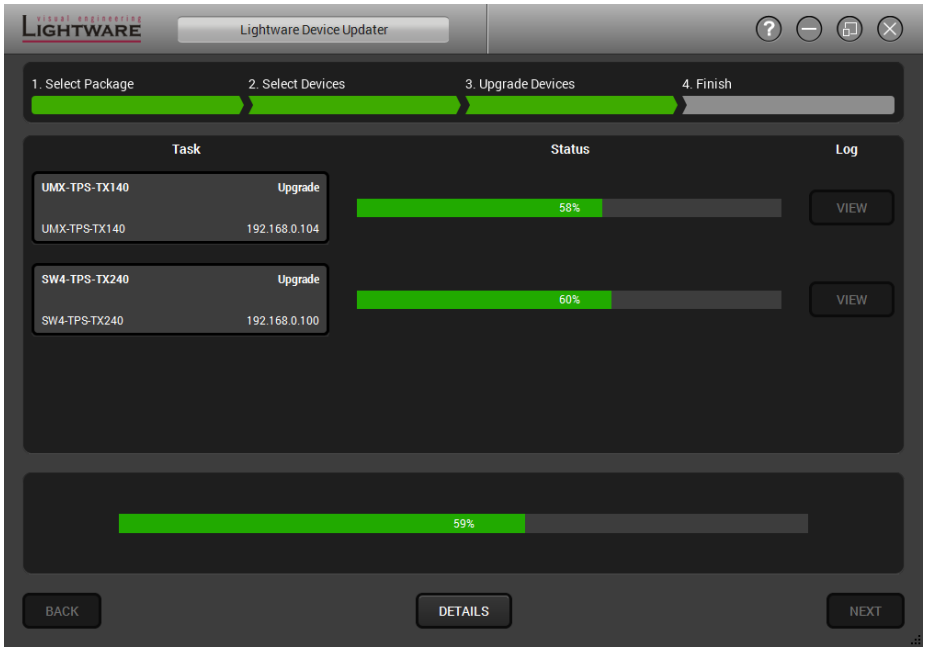
Click on the Next button to continue.

Step 3. Upgrade the devices.

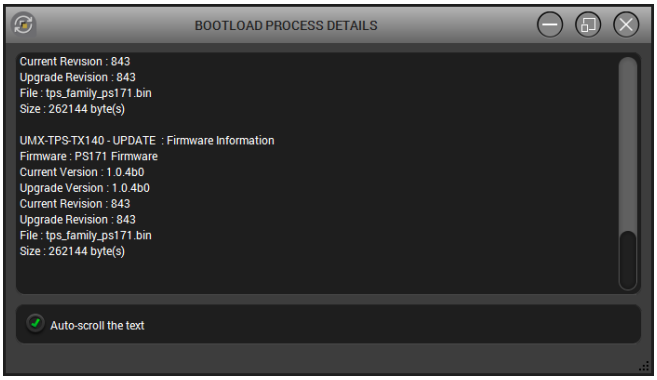
The selected devices and the current status are shown.



Start button begins the upgrade process.

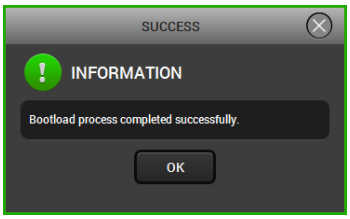


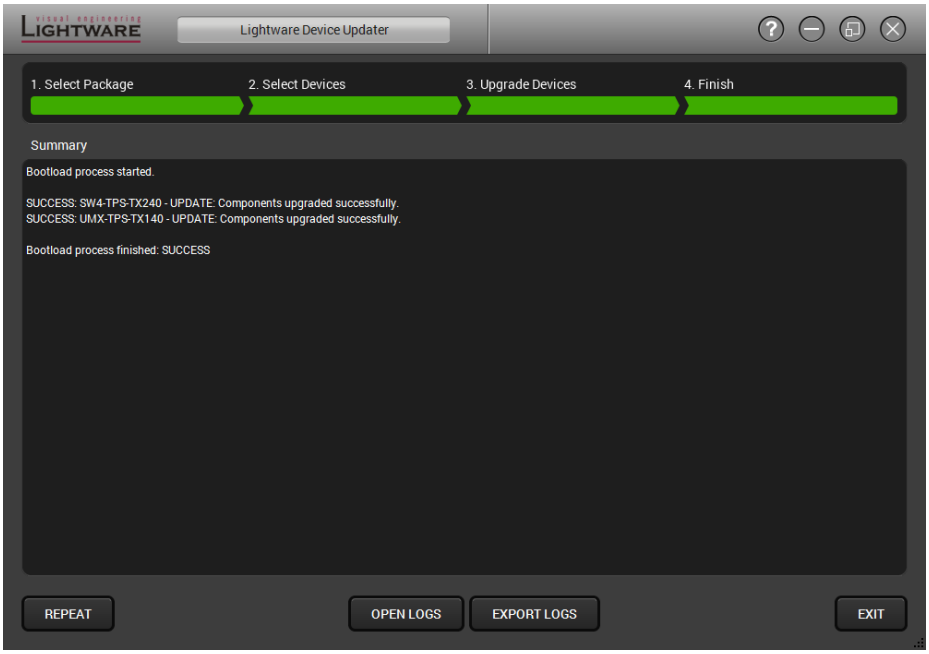
Details button opens a new window where the process is logged – see below.



Step 4. Finish.

If the upgrade of a device is finished, the log can be opened by the View button on the right. When all the tasks are finished, a window appears. Click OK to close and Next to display the summary page.





Repeat button starts the process again with the selected device(s).

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

Export logs by saving the files as a zipped file.

Press **Exit** to close the program.

Info: However the device is rebooted after the firmware upgrade, switching it off and on again is recommended.

Info: If the upgrade failed, the progress bar of the device is changed to red; restart the device(s) and repeat the process.

10. 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 receiver end.

At first check front panel LEDs and take the necessary steps according to their states. For more information about status LEDs refer to section 5.1 on page 30 and section 5.2 on page 31.

Symptom	Root cause	Action	Refer to
Video signal			
No picture on the video output port (receiver)	Device(s) not powered properly	Check the extenders and the other devices if they are properly powered; try to unplug and reconnect them.	
	Cable connection problem	Cables must fit very well, check all the connectors (video and TPS cables).	Section 2.5
	Not the desired video port is selected	Check the Crosspoint settings.	Section 6.5
	TPS mode problem	Check the actual TPS mode and the selected modes of the extenders.	Section 6.6.6
	Autoselect is “disconnect”	If the Autoselect is enabled, check the settings.	Section 6.6.6
	The output is muted	Check the mute state of output ports.	Section 6.6.6
	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).	Section 6.7.2
	Data rate is too high for the cable	Select a lower resolution or use another type of cable; if the source is a computer try to modify the refresh rate (only for expert users).	Section 11.3
	HDCP is disabled	Enable HDCP on the input port.	Section 6.6
Audio signal			
No audio is present on output	Other audio port is switched to the output	Check the crosspoint settings of audio layer.	Section 6.5
	Source audio volume is low or muted	Check the audio settings of the source.	
	Output port is muted	Check the output port properties.	Section 6.6.6
	Analog audio: volume is set very low	Check the Analog audio input port settings (Volume).	Section 6.6.5
HDMI output signal contains no audio	HDMI mode was set to DVI	Check the properties of the output port and set to HDMI or Auto.	Section 6.6.6
	DVI EDID is emulated	Check the EDID and select and HDMI EDID to emulate.	Section 6.7.2

Symptom	Root cause	Action	Refer to
RS-232 and infrared signals			
Connected serial device cannot does not respond	Cable (connection) problem	Check the connectors to fit well; check the wiring of the plugs.	Section 2.5.8
	RS-232 settings are different	Check the port settings of the transmitter and/or the receiver and the connected serial device(s). Pay attention to Link and/or Local ports.	Section 6.8.1
	RS-232 mode is not right	Check the RS-232 mode settings (pass, control or command injection)	Section 6.8.1
Connected IR device cannot be controlled	IR emitter and/or detector problem	Check if the IR emitter is plugged in the IR output and the IR detector in the IR input connector. The infra devices must "see" each other.	
Network			
No LAN connection can be established	Incorrect IP address is set (fix IP)	Use dynamic IP address by enabling DHCP option.	Section 5.6.3
		Restore the factory default settings (with fix IP).	Section 5.6.2
	IP address conflict	Check the IP address of the other devices, too.	
Miscellaneous			
Front panels are out of operation	Front panel buttons are locked	Unlock the buttons	Section 5.6.1
Error messages received always	Different protocol is set	Check the port protocol settings (LW2 / LW3) and use the proper protocol commands.	

11. Appendix

11.1. Specifications

General

Compliance	CE, UL
EMI/EMC	EN 55022 Class B
Warranty	3 years
Function buttons	Yes, 4 buttons (1 hidden)
Cooling	Convention only
Operating temperature	0 to +55°C (+32 to +122°F)
Operating humidity	10% to 90%, noncondensing

Power

Power supply	External power adaptor or PoE remote powering
Power adaptor (UMX-TPS)	In 100-240 V AC 50/60 Hz, Out 12V DC, 2.5 A
Power adaptor (WP-UMX-TPS)	In 100-240 V AC 50/60 Hz, Out 48V DC, 1 A
Power connector (UMX-TPS)	Locking DC connector (2.1 mm pin)
Power connector (WP-UMX-TPS)	Phoenix® Combicon (2-pole)
Power over TPS	DC 48V 1 A (IEEE 802.3af)
Power consumption	9 W

Enclosure (UMX-TPS)

Rack mountable	Yes
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 of UMX-TPS-TX-120	629 g
Weight of UMX-TPS-TX-130	642 g
Weight of UMX-TPS-TX-140	647 g

Enclosure (WP-UMX-TPS)

Material	1 mm steel
Dimensions in mm	115.9W x 67.5D x 114.3H
Dimensions in inch	4.56 W x 2.65 D x 4.5 H
Weight of WP-UMX-TPS-TX-120-US	452 g
Weight of WP-UMX-TPS-TX-130-US	457 g

RS-232 control

Serial port connector	3-pole Phoenix connector
Available baud rates	between 4800 and 115200

Video inputs

HDMI input

HDMI connector type ..... 19-pole HDMI Type A receptacle
Standard ..... DVI 1.0, HDMI 1.4
Color depth ..... Deep color support up to 36 bits, 12 bit/color
Color space ..... RGB, YCbCr 4:4:4, YcbCr 4:2:2
Video delay ..... 0 frame
Max. resolutions ..... 1600x1200@60 Hz, 36 bit
..... 3840x2160@30 Hz, 24 bit
Reclocking ..... Pixel Accurate Reclocking
3D support ..... Yes
HDCP 1.1 compliant ..... Yes

VGA input

Connector type ..... DE-15F (15-pole D-sub Female)
Supported video signal ..... Analog RGB and YpbPr video
Color depth ..... Up to 24 bits, 8 bit/color
Max. data rate ..... Up to 170 MHz video and graphics digitizer
Max. resolution ..... Up to 1600x1200@60 Hz

DVI-I input with DVI-D support (only on UMX-TPS-TX130 and TX140)

Connector type ..... 29-pole, DVI-I
Standard ..... DVI 1.0, HDMI 1.4
Color depth ..... Deep color support up to 36 bits, 12 bit/color
Color space ..... RGB, YcbCr 4:4:4, YcbCr 4:2:2
Video delay ..... 0 frame
Max. resolutions ..... 1600x1200@60 Hz, 36 bit
..... 3840x2160@30 Hz, 24 bit
Reclocking ..... Pixel Accurate Reclocking
3D support ..... Yes
HDCP 1.1 compliant ..... Yes

DVI-I input with DVI-A support (only on UMX-TPS-TX130 and TX140)

Connector type ..... 29-pole, DVI-I
Supported video signal ..... Analog RGB and YpbPr video
Color depth ..... Up to 24 bits, 8 bit/color
Max. data rate ..... Up to 170 MHz video and graphics digitizer
Max. resolution ..... Up to 1600x1200@60 Hz

DisplayPort input (only on UMX-TPS-TX140 and WP-UMX-TPS-TX130-US)

DisplayPort connector type ..... 20-pole, DP 1.1a receptacle

Color depth ..... Deep color support up to 36 bits, 12 bit/color

Color space ..... RGB, YcbCr 4:4:4, YcbCr 4:2:2

Video delay ..... 0 frame

Max. resolutions ..... 2560x1600@60 Hz

..... 4096x2400@30 Hz

3D support ..... Yes

HDCP 1.3 compliant ..... Yes

EDID management

EDID emulation ..... Yes, both on the analog and on the digital inputs

EDID memory ..... 119 factory presets, 15 user programmable

Audio inputs

Embedded audio signal

Supported on ..... DP, DVI-D, HDMI ports

Supported audio formats ..... PCM (up to 192 kHz), MPCM (up to 8 channels)

Analog audio input

Signal type ..... PCM, Compressed, DSD, High Bitrate

Sampling frequency ..... 48 kHz

Gain ..... -95 dB – 0 dB

Connector ..... 3.5 mm Jack / 5-pole Phoenix*

Adjustable levels ..... Volume, Balance

* Phoenix connector can be found only on UMX-TPS-TX140.

GPIO (only on UMX-TPS-TX130 and TX140)

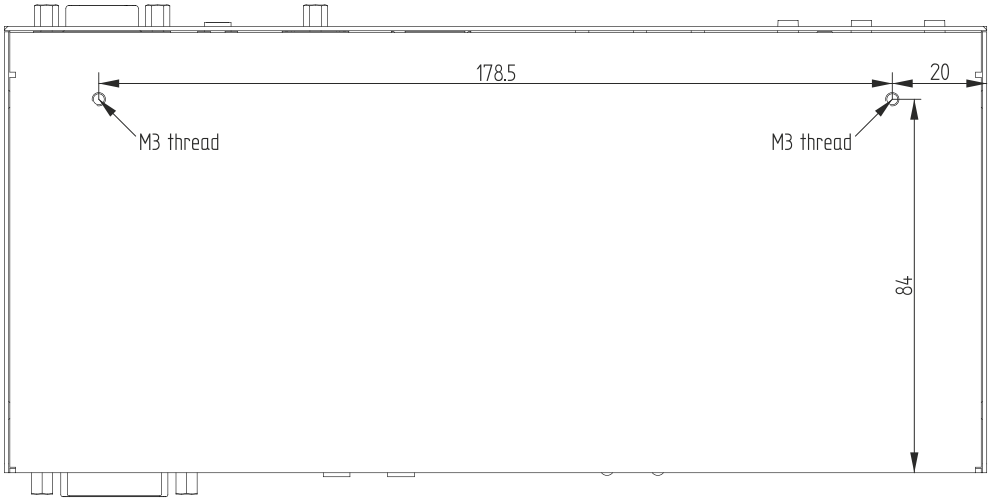
Port connector ..... 8-pole Phoenix connector

Port direction ..... Input or output

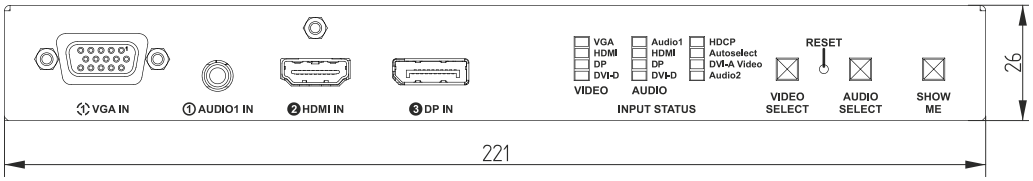
11.2. Mechanical drawings (UMX-TPS)

UMX-TPS-TX140 can be seen on the pictures, but the dimensions are the same for all the three models. Dimensions are in mm.

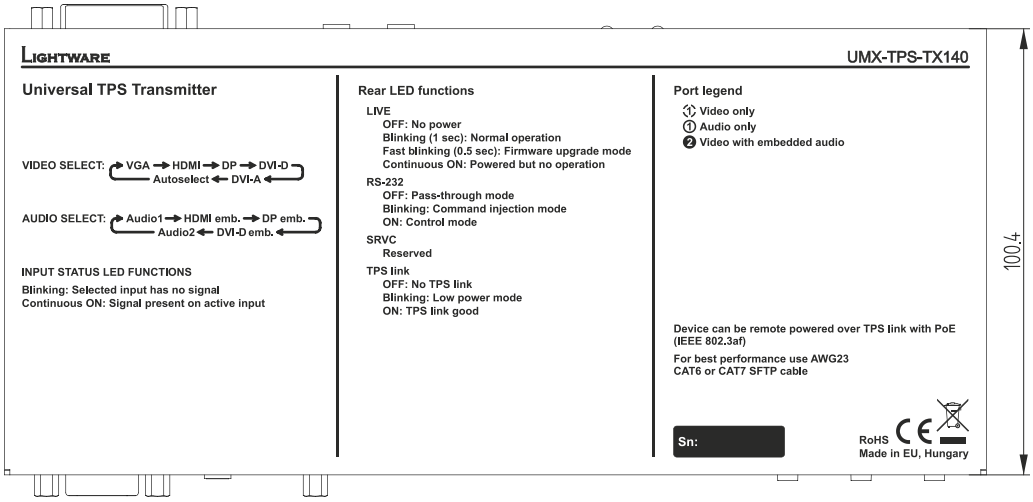
Bottom view



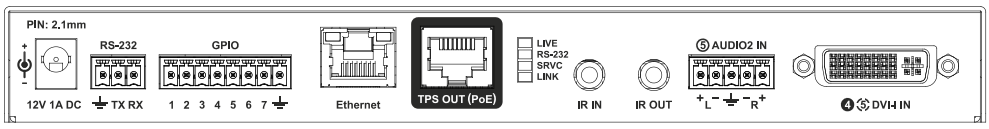
Front view



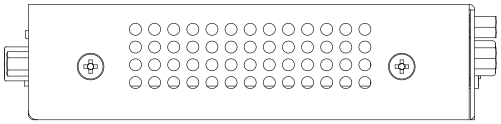
Top view



Rear view



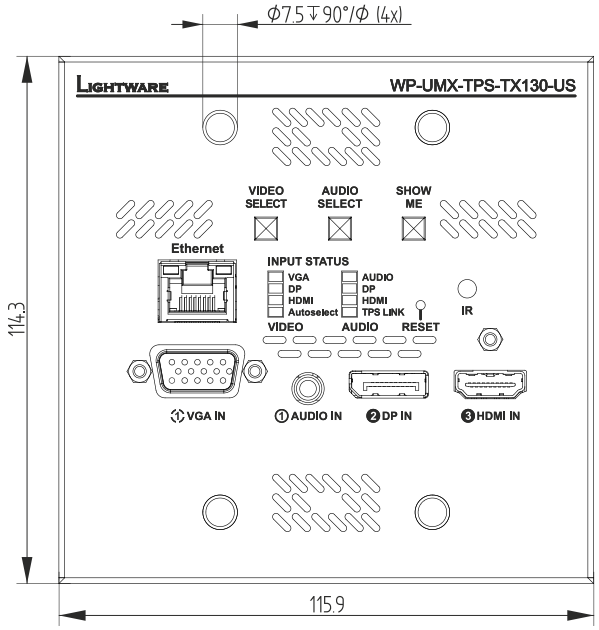
Side view



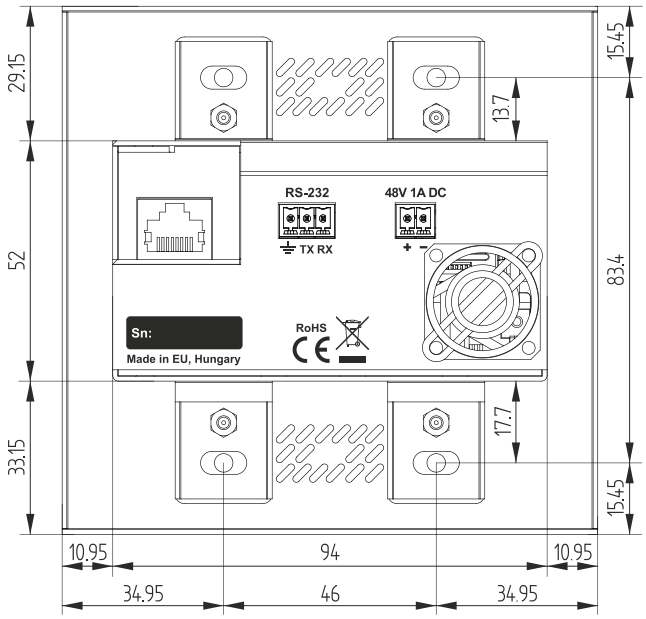
11.3. Mechanical drawings (WP-UMX-TPS)

WP-UMX-TPS-TX130-US can be seen on the pictures, but the dimensions are the same for both models. Dimensions are in mm.

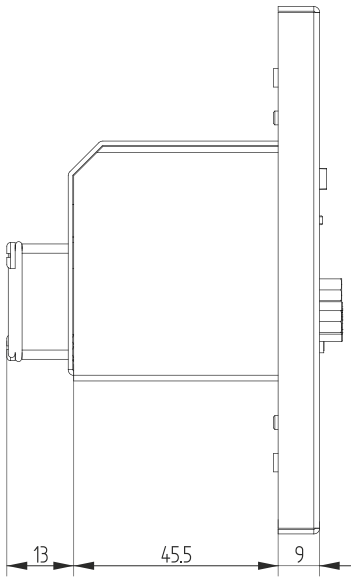
Front view



Rear view



Side view



11.4. Maximum twisted pair distances

Resolution	Pixel clock rate	Cable lengths (Auto / Longreach TPS mode)		
		CAT5e AWG24	CAT7 AWG26**	CAT7 AWG23
1024x768@60Hz	65 MHz	100 m / 130 m*	90 m / 120 m*	120 m / 170 m*
1280x720p@60Hz	73.8 MHz	100 m / 130 m*	90 m / 120 m*	120 m / 170 m*
1920x1080p@60Hz / 24bpp	148.5 MHz	100 m / 130 m*	90 m / 120 m*	120 m / 170 m*
1920x1200@60Hz	152.9 MHz	100 m / NA	90 m / NA	120 m / NA
1600x1200@60Hz	162 MHz	100 m / NA	90 m / NA	120 m / NA
1920x1080@60Hz / 36bpp	222.75 MHz	70 m / NA	70 m / NA	120 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

Above values are valid when the transmitter is powered by a local adaptor; distances may decrease depending on the powering mode (local or remote) and cable quality.

* Longreach TPS mode supports pixel clock frequencies up to 148.5 MHz.

** AWG 26 cables are not recommended with remote powering.

*** If 4K video is selected to the output, analog audio cannot be embedded to the video stream due to the capabilities of the video IC, thus the original audio stream is transmitted.

11.5. Input/output port numbering

The following tables contain the input and output ports with their ID numbers which shall be used when protocol command sending or in Lightware Device Controller.

WP-UMX-TPS-TX120-US

Port name	Video port nr. (LW2)	Video port nr. (LW3)	Emulated EDID memory	Audio port nr. (LW2)	Audio port nr. (LW3)
VGA in	I1	P1	E1	-	-
HDMI in	I2	P2	E2	I2	P2
Test pattern	I3	P3	-	-	-
Audio1 in	-	-	-	I1	P1
TPS out	O1	P4	-	O1	P3

WP-UMX-TPS-TX130-US

Port name	Video port nr. (LW2)	Video port nr. (LW3)	Emulated EDID memory	Audio port nr. (LW2)	Audio port nr. (LW3)
VGA in	I1	P1	E1	-	-
DP in	I2	P2	E2	I2	P2
HDMI in	I3	P3	E3	I3	P3
Test pattern	I4	P4	-	-	-
Audio1 in	-	-	-	I1	P1
TPS out	O1	P5	-	O1	P4

UMX-TPS-TX120

Port name	Video port nr. (LW2)	Video port nr. (LW3)	Emulated EDID memory	Audio port nr. (LW2)	Audio port nr. (LW3)
VGA in	I1	P1	E1	-	-
HDMI in	I2	P2	E2	I2	P2
Test pattern	I3	P3	-	-	-
Audio1 in	-	-	-	I1	P1
TPS out	O1	P4	-	O1	P3

UMX-TPS-TX-130

Port name	Video port nr. (LW2)	Video port nr. (LW3)	Emulated EDID memory	Audio port nr. (LW2)	Audio port nr. (LW3)
VGA in	I1	P1	E1	-	-
HDMI in	I2	P2	E2	I2	P2
DVI-D in	I3	P3	E3	I3	P3
DVI-A in	I4	P4	E4	-	-
Test pattern	I5	P5	-	-	-
Audio1 in	-	-	-	I1	P1
TPS out	O1	P6	-	O4	P4

UMX-TPS-TX140

Port name	Video port nr. (LW2)	Video port nr. (LW3)	Emulated EDID memory	Audio port nr. (LW2)	Audio port nr. (LW3)
VGA in	I1	P1	E1	-	-
HDMI in	I2	P2	E2	I2	P2
DP in	I3	P3	E3	I3	P3
DVI-D in	I4	P4	E4	I4	P4
DVI-A in	I5	P5	E5	-	-
Testpattern	I6	P6	-	-	-
Audio1 in	-	-	-	I1	P1
Audio2 in	-	-	-	I5	P5
TPS out	O1	P7	-	O1	P6

11.6. Factory default settings

Parameter	Setting/Value
Network settings	
IP address	192.168.0.100
Subnet mask	255.255.255.0
Static gateway	192.168.0.1
LW2 Port number	10001
LW3 Port number	6107
HTTP Port number	80
DHCP	disabled
Video port settings	
Analog video source (VGA, DVI-A)	Auto
HDCP (DP, HDMI, DVI-D)	Enabled
No sync screen mode	Auto
No sync screen color	RGB: 0x7F;0x7F;0x7F
No sync screen resolution	640x480
Output TPS mode	Auto
Output HDMI mode	Auto
Output Color space	Auto
Output HDCP	Auto
Selected video on TPS output	VGA input
Power 5V mode	Always on
Autoselect mode	Disabled, Priority detect, No change
Autoselect video priority (UMX-TPS-TX120, WP-UMX-TPS-TX120-US)	0=HDMI, 1=VGA, 2=TESTPATTERN
Autoselect video priority (UMX-TPS-TX130)	0=HDMI, 1=DVI-D, 2=VGA, 3=DVIA, 4=TESTPATTERN
Autoselect video priority (UMX-TPS-TX140)	0=DP, 1=HDMI, 2=DVI-D, 3=VGA, 4=DVIA, 5=TESTPATTERN
Autoselect video priority (WP-UMX-TPS-TX130-US)	0=DP, 1=HDMI, 2=VGA, 3=TESTPATTERN
Audio port settings	
Volume	0.00 dB
Balance	50 (center)
Selected audio on TPS output	Audio (Audio1) input
Autoselect audio priority (UMX-TPS-TX120, WP-UMX-TPS-TX120-US)	0=HDMI, 1=AUDIO
Autoselect audio priority (UMX-TPS-TX130)	0=HDMI, 1=DVI-D, 2=AUDIO
Autoselect audio priority (UMX-TPS-TX140)	0=DP, 1=HDMI, 2=DVI-D, 3=AUDIO1, 4=AUDIO2
Autoselect audio priority (WP-UMX-TPS-TX130-US)	0=HDMI, 1=DP, 2=AUDIO1
Emulated EDIDs	
Analog inputs (VGA and DVI-A)	F89 – Univ_Analog
Digital inputs (HDMI, DP, DVI-D)	D1 – Dynamic EDID
Dynamic	F119 – Univ_4k_All
RS-232 and GPIO settings	
Control protocol	LW2
Baud rate	57600
Databits / Parity / Stopbits	8 / No / 1
Operation mode (Local and Local)	Pass-through
Command injection port nr. (Local)	8001
Command injection port nr. (Link)	8002
GPIO direction	Input
GPIO output level	High

11.7. Factory EDID list

Mem.	Resolution	Type	Mem.	Resolution	Type
F01	640 x 480 @ 60 Hz	D	**F61**	1280 x 768 @ 59.92 Hz	A
F02	848 x 480 @ 60.0 Hz	D	**F62**	1280 x 768 @ 75.0 Hz	A
F03	800 x 600 @ 60.30 Hz	D	**F63**	1360 x 768 @ 60.1 Hz	A
F04	1024 x 768 @ 60.0 Hz	D	**F64**	1364 x 768 @ 50.0 Hz	A
F05	1280 x 768 @ 50.0 Hz	D	**F65**	1364 x 768 @ 59.93 Hz	A
F06	1280 x 768 @ 59.92 Hz	D	**F66**	1364 x 768 @ 74.98 Hz	A
F07	1280 x 768 @ 75.0 Hz	D	**F67**	1280 x 1024 @ 50.0 Hz	A
F08	1360 x 768 @ 60.1 Hz	D	**F68**	1280 x 1024 @ 60.1 Hz	A
F09	1280 x 1024 @ 50.0 Hz	D	**F69**	1366 x 1024 @ 59.99 Hz	A
F10	1280 x 1024 @ 60.1 Hz	D	**F70**	1400 x 1050 @ 49.99 Hz	A
F11	1280 x 1024 @ 75.1 Hz	D	**F71**	1400 x 1050 @ 59.99 Hz	A
F12	1400 x 1050 @ 49.99 Hz	D	**F72**	1400 x 1050 @ 75.0 Hz	A
F13	1400 x 1050 @ 59.99 Hz	D	**F73**	1920 x 540 @ 50.0 Hz	A
F14	1400 x 1050 @ 75.0 Hz	D	**F74**	1920 x 540 @ 59.98 Hz	A
F15	1680 x 1050 @ 59.99 Hz	D	**F75**	1920 x 1080 @ 50.0 Hz	A
F16	1920 x 1080 @ 50.0 Hz	D	**F76**	1920 x 1080 @ 60.0 Hz	A
F17	1920 x 1080 @ 60.0 Hz	D	**F77**	1600 x 1200 @ 50.0 Hz	A
F18	2048 x 1080 @ 50.0 Hz	D	**F78**	1600 x 1200 @ 60.0 Hz	A
F19	2048 x 1080 @ 59.99 Hz	D	**F79**	1920 x 1200 @ 59.55 Hz	A
F20	1600 x 1200 @ 50.0 Hz	D	**F80**	1920 x 1200 @ 50.0 Hz	A
F21	1600 x 1200 @ 60.0 Hz	D	**F81**	Reserved	
F22	1920 x 1200 @ 50.0 Hz	D	**F82**	Reserved	
F23	1920 x 1200 @ 59.55 Hz	D	**F83**	Reserved	
F24	2048 x 1200 @ 59.95 Hz	D	**F84**	Reserved	
F25	Reserved		**F85**	Reserved	
F26	Reserved		**F86**	Reserved	
F27	Reserved		**F87**	Reserved	
F28	Reserved		**F88**	Reserved	
F29	**Universal_DVI**	D	**F89**	**Univ_Analog**	A
F30	1440 x 240i @ 60.3 Hz	H	**F90**	1920 x 2160 @ 59.98 Hz	DL
F31	1440 x 288i @ 50.6 Hz	H	**F91**	1024 x 2400 @ 60.1 Hz	DL
F32	640 x 480 @ 59.94 Hz	H	**F92**	1920 x 2400 @ 59.97 Hz	DL
F33	720 x 480 @ 59.92 Hz	H	**F93**	2048 x 2400 @ 59.97 Hz	DL
F34	720 x 576 @ 50.0 Hz	H	**F94**	2048 x 1536 @ 59.99 Hz	DL
F35	1280 x 720 @ 50.0 Hz	H	**F95**	2048 x 1536 @ 74.99 Hz	DL
F36	1280 x 720 @ 60.0 Hz	H	**F96**	2560 x 1600 @ 59.85 Hz	DL
F37	1920 x 540i @ 50.3 Hz	H	**F97**	3840 x 2400 @ 23.99 Hz	DL
F38	1920 x 540i @ 50.0 Hz	H	**F98**	1280 x 720 @ 60.0 Hz	H3D
F39	1920 x 540i @ 59.98 Hz	H	**F99**	1920 x 1080 @ 60.0 Hz	H3D
F40	1920 x 540i @ 60.5 Hz	H	**F100**	1024 x 768 @ 60.0 Hz	H
F41	1920 x 1080 @ 24.0 Hz	H	**F101**	1280 x 1024 @ 50.0 Hz	H
F42	1920 x 1080 @ 24.99 Hz	H	**F102**	1280 x 1024 @ 60.1 Hz	H
F43	1920 x 1080 @ 30.0 Hz	H	**F103**	1280 x 1024 @ 75.1 Hz	H
F44	1920 x 1080 @ 50.0 Hz	H	**F104**	1600 x 1200 @ 50.0 Hz	H
F45	1920 x 1080 @ 59.93 Hz	H	**F105**	1600 x 1200 @ 60.0 Hz	H
F46	1920 x 1080 @ 60.0 Hz	H	**F106**	1920 x 1200 @ 59.55 Hz	H
F47	**Universal_HDMI_PCM**	H	**F107**	2560 x 1440 @ 59.94 Hz	H
F48	**Universal_HDMI_ALL**	H	**F108**	2560 x 1600 @ 59.85 Hz	H
F49	**Universal_HDMI_DC**	H	**F109**	3840 x 2400 @ 23.99 Hz	H4K
F50	720 x 480 @ 30.1 Hz	A	**F110**	3840 x 2160 @ 24.0 Hz	H4K
F51	720 x 576 @ 25.3 Hz	A	**F111**	3840 x 2160 @ 25.0 Hz	H4K
F52	640 x 480 @ 60.0 Hz	A	**F112**	3840 x 2160 @ 30.0 Hz	H4K
F53	640 x 480 @ 75.0 Hz	A	**F113**	Reserved	
F54	800 x 600 @ 50.0 Hz	A	**F114**	Reserved	
F55	800 x 600 @ 60.3 Hz	A	**F115**	Reserved	
F56	800 x 600 @ 74.99 Hz	A	**F116**	Reserved	
F57	1024 x 768 @ 49.98 Hz	A	**F117**	Reserved	
F58	1024 x 768 @ 60.0 Hz	A	**F118**	**Universal_4K_PCM**	H4K
F59	1024 x 768 @ 75.2 Hz	A	**F119**	**Universal_4K_ALL**	H4K
F60	1280 x 768 @ 50.0 Hz	A			

EDID types: **D**=DVI EDID; **H**=HDMI EDID; **A**=Analog EDID; **DL**=Dual-Link DVI EDID; **H3D**=HDMI EDID with 3D support; **H4K**: HDMI EDID with 4K resolution support

12. Version applicability

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

	version
UMX-TPS-TX100 series firmware	1.0.3
Lightware Device Controller software	1.4.0b2
Lightware Device Updater software	1.1.0b0
Hardware	1.1

13. Warranty

Lightware Visual Engineering warrants this product against defects in materials and workmanship for a period of three years from the date of purchase.

The customer shall pay shipping charges when unit is returned for repair. Lightware will cover shipping charges for return shipments to customers.

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

Lightware Visual Engineering

Peterdy 15, Budapest H-1071, Hungary

E-mail: support@lightware.eu

14. Document revision history

Document	Release Date	Changes	Editor
Rev. 1.0	26-09-2014	Initial version	Laszlo Zsedenyi
Rev. 1.1	14-11-2014	Firmware upgrade, Event manager, Troubleshooting sections added, LW3 programmers' reference updated	Zsolt Marko Laszlo Zsedenyi
Rev. 1.2	04-12-2014	Minor changes in software control section due to new LDC; SRVC LED function added	Laszlo Zsedenyi
Rev. 1.3	17-03-2015	WP-UMX transmitters added, certain figures replaced	Laszlo Zsedenyi
Rev. 1.4	07-07-2015	Autoselect figures changed, LDC and LDU sections upgraded, typographical corrections and minor formatting changes	Laszlo Zsedenyi