visual engineering

LIGHTWARE

Quick Start Guide

DVI-HDCP-TPS-TX210, DVI-HDCP-TPS-TX220
HDMI-TPS-TX210, HDMI-TPS-TX220
DP-TPS-TX210, DP-TPS-TX220

Important Safety Instructions

Please read the supplied safety instruction document before using the product and keep it available for future reference.

Introduction

Thank you for choosing Lightware TPS-TX200 series transmitter. The products have HDBaseT™ integration with additional Lightware developments. The devices transmit HDMI/DVI digital video signal up to 4K resolution, audio and control up to 170 m distance over a single CAT cable (in case of DP-TPS transmitters the DP signal is converted to HDMI).

Compatible Devices

The transmitters are compatible with all Lightware TPS receivers, matrix boards and third party devices based on HDBase-T™ technology.

Power Supply Options

The transmitters can be powered:
- Locally with the supplied 12V DC adaptor or Lightware's rack mountable PSU, or
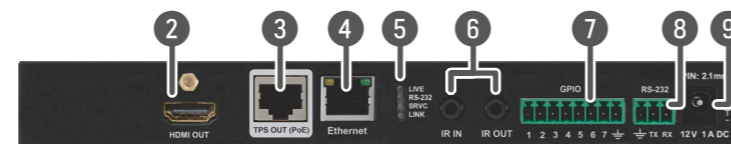- Remotely by a PoE-compatible power injector, like Lightware's TPS-PI-1P1.

For more information please turn the paper.

ℹ *TPS-TX/RX95 are not PoE-compatible, thus not able to remote power the TPS-TX200 series and vica versa. TPS-TX200 series contains PoE-compatible remote power function, RX95 can be remote powered only by TX95 transmitter.*
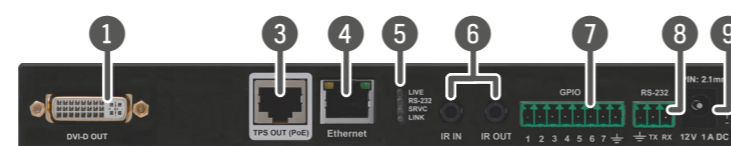
HDBaseT™ and the HDBaseT Alliance logo are trademarks of the HDBaseT Alliance.

Box Contents

Transmitter unit	12V DC power adaptor with interchangeable plugs	Infrared transmitter unit
Phoenix combicon 3-pole connector	Safety and warranty info, Quick Start Guide	Phoenix combicon 8-pole connector*

* Only for DVI-HDCP-TPS-TX220, HDMI-TPS-TX220 and DP-TPS-TX220 models.

Types of IR connectors (1/8" TRS / TS)

2 pole, 1 ring: IR transmitter

3 pole, 2 rings: IR receiver

Front Views

HDMI-TPS-TX220

DVI-HDCP-TPS-TX220
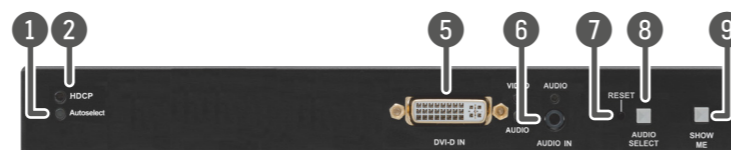
DP-TPS-TX220

1	Autoselect LED	LED gives feedback about the current Autoselect status.
2	HDCP LED	LED gives feedback about the HDCP status of the output signal.
3	DisplayPort input	DisplayPort connector for DisplayPort audio/video signal.
4	HDMI input	HDMI connector for DVI video or HDMI video and audio.
5	DVI-D input	DVI-I connector for DVI-D video and audio.
6	Audio input	3.5 mm Jack connector for unbalanced analog audio input signal.
7	Video select button	Button for selecting a video source.
8	Audio select button	Button for selecting an audio source.
9	Show me button	Special functions can be reached using this button (firmware upgrade (bootload) mode, DHCP settings, restore factory default settings, condition launching in Event Manager).

Rear Views

HDMI-TPS-TX220, DP-TPS-TX220

DVI-HDCP-TPS-TX220

Locking DC Plug

Twist 90° clockwise to lock.

1	DVI-D output	Local DVI-D output with the same A/V content as the TPS output.
2	HDMI output	Local HDMI output with the same A/V content as the TPS output.
3	TPS output	Locking RJ45 connector for HDBaseT™ signal transmission.
4	Ethernet	Locking RJ-45 connector for configuring the device using Lightware Device Controller (LDC), or upgrading it using Lightware Device Updater (LDU). Any third-party control system can use this port to control the device.
5	Status LEDs	The LEDs give feedback about the actual state of the device.
6	IR IN and IR OUT	3-pole TRS connector, also known as 3.5 mm (1/8") jack plug for optional IR receiver (IR IN) and transmitter (IR OUT) connection.
7	GPIO port	8-pole Phoenix connector for configurable general purpose input/output ports.
8	RS-232 port	3-pole Phoenix connector for controlling the device by LDC or third-party control systems.
9	12V DC input	12V DC input for local powering.

Connecting Steps

PC   Media player

DVI-I   Audio

DVI-HDCP-TPS-TX220

Power

CATx → Compatible TPS Receiver

LAN   GPIO   RS-232   IR

Ethernet   Relay box   Touch panel   Infrared

DVI	Connect the source (e.g. a PC) to the DVI-I input port by a DVI cable.
Audio	Connect an audio source (e.g. a Media player) to the 3.5 analog audio input port.
CATx	Connect the TPS output port of the transmitter to the **TPS+PoE** port of the TPS-PI-1P1 by a CATx cable. Connect the receiver (or the Matrix input board) to the power injector by a CATx cable via the TPS port.
RS-232	Optionally for RS-232 extension: connect a controller/controlled device (e.g. Touch panel) to the RS-232 port.
IR	Optionally for Infrared extension: • Connect the IR emitter to the IR OUT port of the transmitter, and/or • Connect the IR detector to the IR IN port of the transmitter.
LAN	Optionally connect the transmitter to a LAN.
GPIO	Optionally connect the transmitter to a LAN.
Power	Powering on the devices is recommended to do as the final step during the installation. Please see the **Power Supply Options** section for the details.

Front Panel LEDs

Video Source
- OFF: video source is not selected.
- BLINKING: video source is selected but not active.
- ON: video source is selected and active.

Audio Sources
- OFF: audio source is not selected.
- BLINKING: audio source is selected but not active.
- ON: (with short pause): audio source is selected and the port is active but not embedded to the output video stream (DVI output mode).
- ON: (continuously): audio source is selected, the port is active and the audio is embedded to the output video stream (HDMI output mode).

ℹ *When Autoselect is enabled and audio signal is not present at all, audio LEDs blink.*

HDCP LED
- OFF: video output signal is not encrypted with HDCP.
- ON: video output signal is encrypted with HDCP.

Autoselect LED
- OFF: autoselect is disabled.
- BLINKING: autoselect is enabled; searching for signal (audio LEDs also blink).
- ON: autoselect is enabled; active signal is found (the LED of selected audio also lights).

Rear Panel LEDs

LIVE
- OFF: device is not powered.
- BLINKING (slow): device is powered and operational.
- BLINKING (fast): device is in bootload mode.
- ON: device is powered but no operation.

RS-232 LED
- OFF: RS-232 ports (local and link) are in Pass-through mode.
- BLINKING: command injection mode is active.
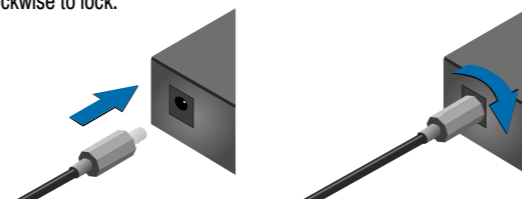- ON: RS-232 ports (local and link) are in Control mode.

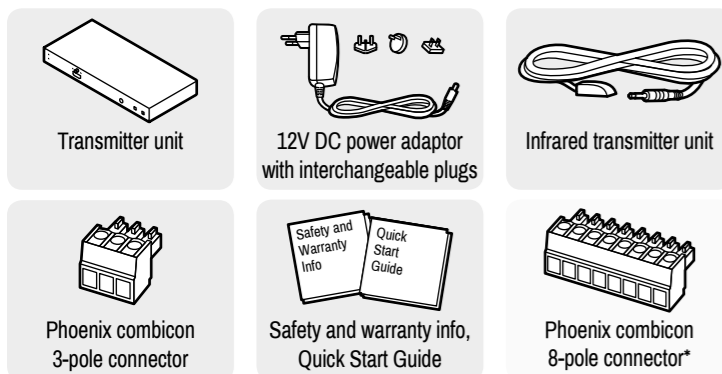### SRVC
Reserved for future developments.

LINK
- OFF: no TPS link between transmitter and receiver.
- BLINKING (slow): low power mode is active.
- BLINKING (fast): Ethernet fallback mode is active.
- ON: TPS link is established, HDBaseT or Long Reach mode is active.

Further information

The document is valid with the following firmware version: 1.1.4
The User's manual of this appliance is available at www.lightware.com.
See the Downloads section on the dedicated product page.
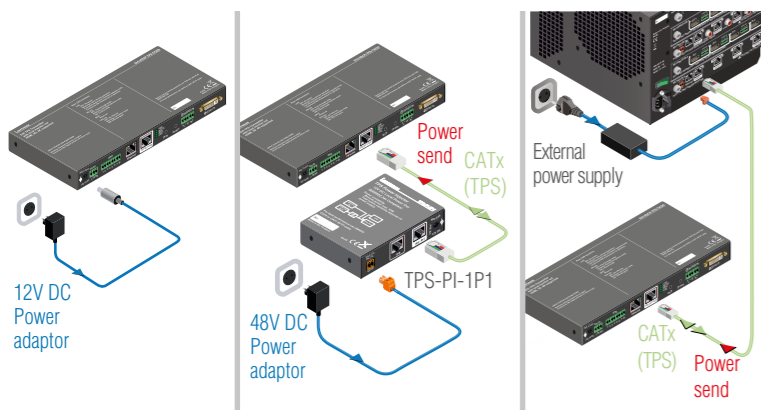
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Doc. ver.: 2.1
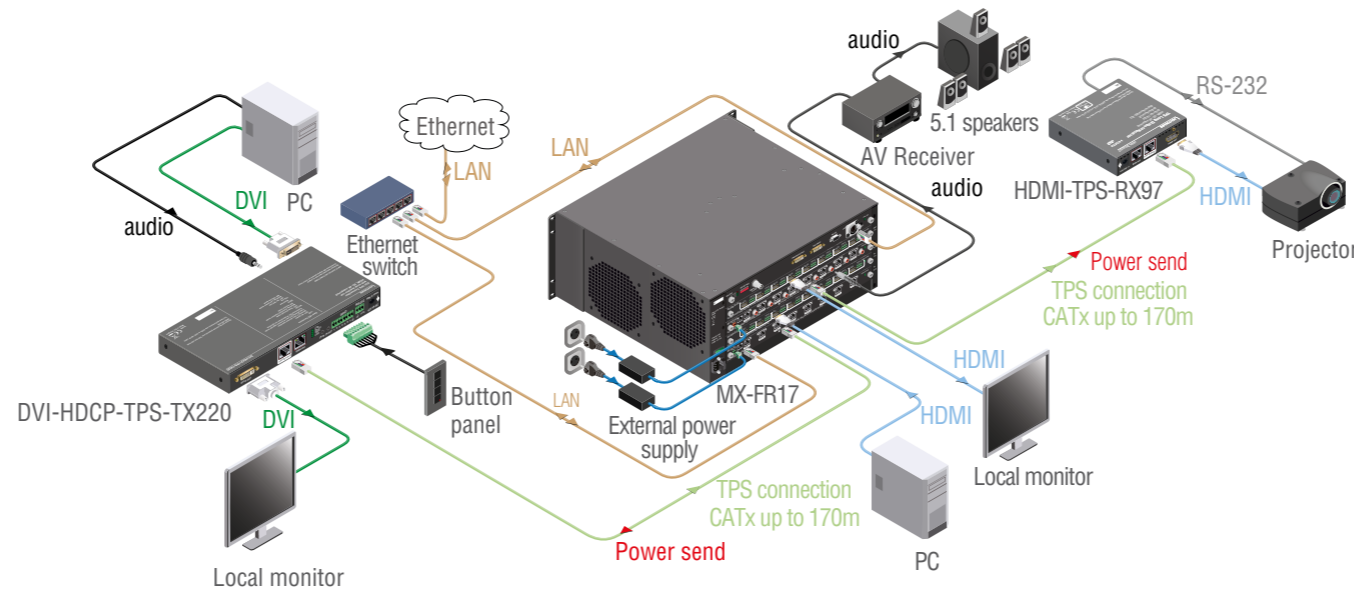19200111

Power Supply Options

The transmitters can be powered:

- Locally with the supplied 12V DC adaptor or Lightware's rack mountable PSU, or
- Remotely by a PoE-compatible power injector, like Lightware's TPS-PI-1P1.
- Powering by a matrix board over the TPS (CATx) cable. Output board needs to be powered by an external PSU.

12V DC Power adaptor

TPS-PI-1P1

48V DC Power adaptor

Power send

CATx (TPS)

External power supply

CATx (TPS)

Power send

Power send

ℹ *TPS-TX200 series transmitters are PoE-compatible and can receive power over the TPS line. The TPS-TX/RX95 extenders are not PoE-compatible thus not able to send/receive power to/from a TPS-TX200 transmitter.*

Typical Application

audio

Ethernet

LAN

LAN

5.1 speakers

AV Receiver

audio

RS-232

HDMI-TPS-RX97

HDMI

Projector

DVI   PC

audio

Ethernet switch

DVI-HDCP-TPS-TX220

DVI

Button panel

LAN

External power supply

MX-FR17

Power send

TPS connection CATx up to 170m

HDMI

HDMI

Local monitor

Local monitor

TPS connection CATx up to 170m

Power send

PC

GPIO - General Purpose Input/Output Ports

The TX220 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 following:

	Input voltage (V)	Output voltage (V)	Max. current (mA)
Logical low level	0 - 0.8	0 - 0.5	30
Logical high level	2 -5	4.5 - 5	18

GPIO connector and plug pin assignment

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

ℹ *The total available current of the controller is 180 mA.*

Software Control – Using Lightware Device Controller (LDC)

The device can be controlled from a computer through the Ethernet port using Lightware Device Controller. Please download the application from www.lightware.com, install on a Windows PC or a macOS and connect to the device via the Ethernet port. LDC software contains many useful built-in tools which can be used for signal analysis like the followings:

Frame Detector

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. timing parameter difference).
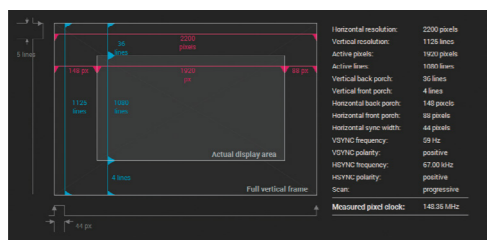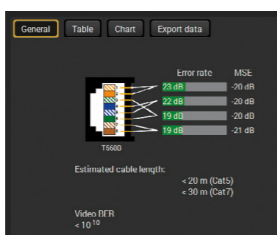

Test Pattern Generator

The output ports can send a special image towards the sink devices for testing purposes. The settings of the test pattern are available via LDC, see the available patterns below:
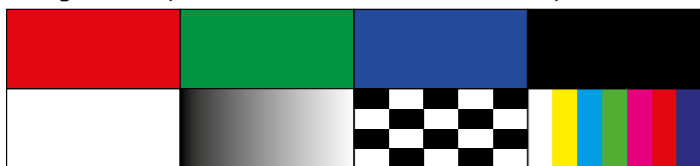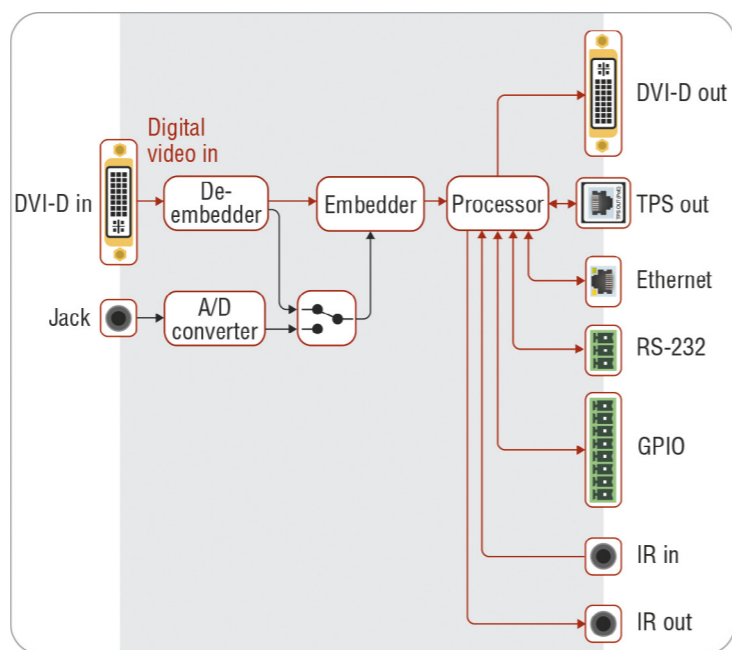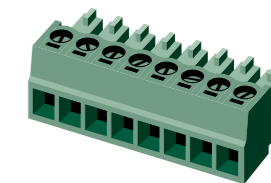

TPS Cable Diagnostics

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.

Port Diagram (DVI-HDCP-TPS-TX220)

Digital video in

DVI-D in

De-embedder

Embedder

Processor

DVI-D out

TPS out

Ethernet

RS-232

GPIO

Jack

A/D converter

IR in

IR out

Restore Factory Default Settings

1. Keep the Show me button pressed for 10 seconds; after 5 seconds front panel LEDs start to blink but keep the buttons pressed; the LEDs start to blink faster 5 seconds later.
2. Release the button, then press it 3 times quickly; factory default settings are restored:

IP address (fix)	192.168.0.100
Subnet mask	255.255.255.0
Static gateway	192.168.0.1
DHCP	Disabled
TCP/IP port nr. LW2 / LW3	10001 / 6107
Crosspoint setting (Audio)	Embedded audio
Autoselect	Disabled
Output TPS mode	Auto
Emulated EDID	Dynamic
RS-232 mode	Pass-through
RS-232 control protocol	LW2
RS-232 port setting	57600 BAUD, 8, N, 1
Command injection port (local / link)	8001 / 8002
GPIO output level / direction	High / Input

Setting a Dynamic IP Address

1. Keep the Show me button pressed for 5 seconds; front panel LEDs start to blink.
2. Release the button, then press it 3 times quickly. DHCP is now enabled.

Mounting Options

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

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

⚠ *Using different (e.g. longer) screws may cause damage to the device.*

ℹ *The transmitters are half-rack sized.*

Maximum Extension Distances

Resolution	Pixel clock rate	Cable lengths (Auto / Long reach TPS mode)		
		CAT5e AWG24	CAT7 AWG26	CAT7 AWG23
1024x768@60Hz	65 MHz	100 m / 130 m*	90 m / 120 m*	120 m / 170 m*
1280x720p@60Hz	73.8 MHz	100 m / 130 m*	90 m / 120 m*	120 m / 170 m*
1920x1080p@60Hz (24bpp)	148.5 MHz	100 m / 130 m*	90 m / 120 m*	120 m / 170 m*
1920x1200@60Hz	152.9 MHz	100 m / NA	90 m / NA	120 m / NA
1600x1200@60Hz	162 MHz	100 m / NA	90 m / NA	120 m / NA
1920x1080@60Hz (36bpp)	223 MHz	70 m / NA	70 m / NA	100 m / NA
3840x2160@30Hz UHD	297 MHz	70 m / NA	70 m / NA	100 m / NA
4096x2160@30Hz 4K	297 MHz	70 m / NA	70 m / NA	100 m / NA

* Long reach TPS mode supports pixel clock frequencies up to 148.5 MHz.

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. To specify the accurate extension distances, please also check the documentation of the connected HDBaseT-compatible device.

ℹ *CAT7 SFTP AWG23 cable is always recommended.*

Audio Cable Wiring Guide
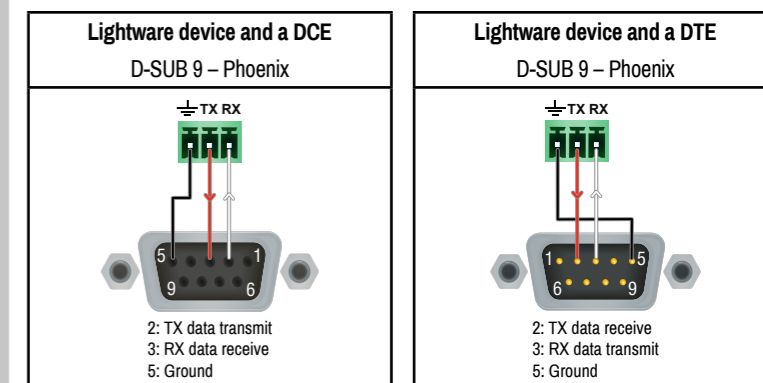
The transmitters are built with 5-pole Phoenix input connector. See below a few example of the most common assembling cases.

From balanced output to balanced input 2x6.3 (1/4") TRS - Phoenix	From balanced output to balanced input 2xXLR - Phoenix
From unbalanced output to balanced input 3.5 (1/8") TRS - Phoenix	From unbalanced output to balanced input 2xRCA - Phoenix

For more information about audio cable wiring see the user's manual of the device or the **Wiring Guide** on our website www.lightware.com.

Wiring Guide for RS-232 Data Transmission

The transmitters are built with 3-pole Phoenix connector. See the below examples of connecting to a DCE (Data Circuit-terminating Equipment) or a DTE (Data Terminal Equipment) type device:

Lightware device and a DCE D-SUB 9 – Phoenix	Lightware device and a DTE D-SUB 9 – Phoenix
2: TX data transmit 3: RX data receive 5: Ground	2: TX data receive 3: RX data transmit 5: Ground

For more information about the cable wiring see the user's manual of the device or the **Cable Wiring Guide** on our website www.lightware.com/support/guides-and-white-papers.