




LIGHTWARE TPS-RX97 Series Twisted Pair Hdbase User Guide

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visual engineering
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Quick Start Guide
WP-HDMI-TPS-RX97-EU; -UK; -US; -FP-8AT
FP-HDMI-TPS-RX97-GB3



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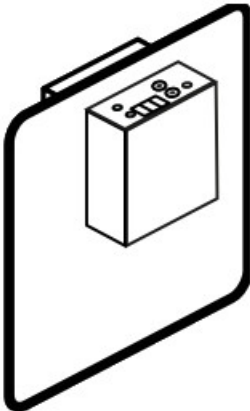
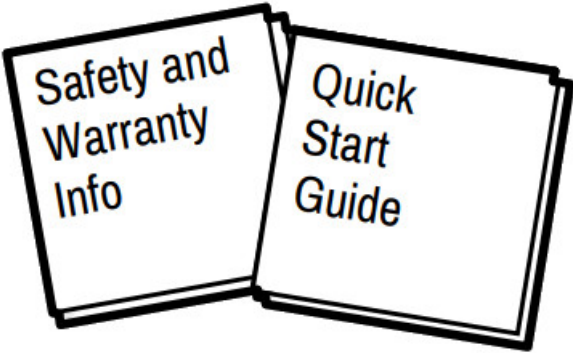
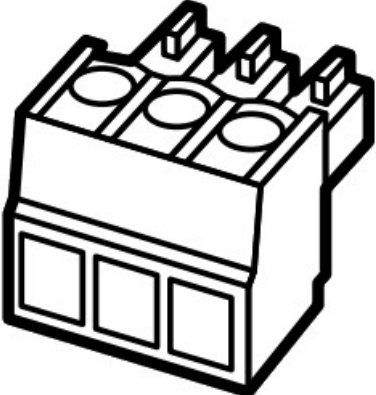
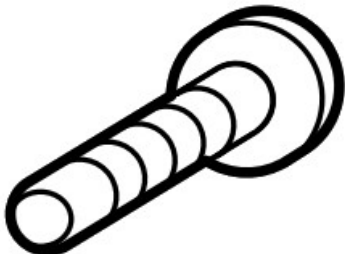
Important Safety Instructions

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

Introduction

WP/FP-HDMI-TPS-RX97 series twisted pair HDBaseT™ extenders provide extension of uncompressed 4K/UHD video with embedded audio (up to eight channel PCM or HBR audio) for long distances over a single CATx cable.

Box Contents

	
Receiver unit	Safety and Warranty info, Quick Start Guide
	
Phoenix® Combicon 3-pole connector	UNC 6-32 bright zinc plated pan head screws (4x) *

* For WP-HDMI-TPS-RX97-FP-8AT model only.

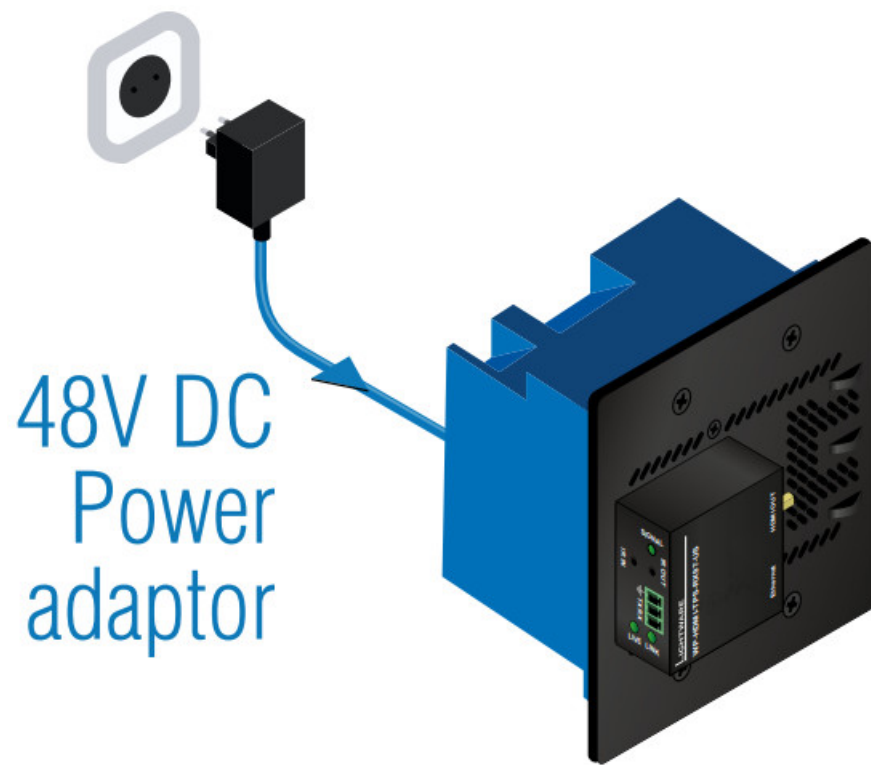
i Please note that the 48V power adaptor is an optional accessory which can be purchased separately.

Power Supply Options

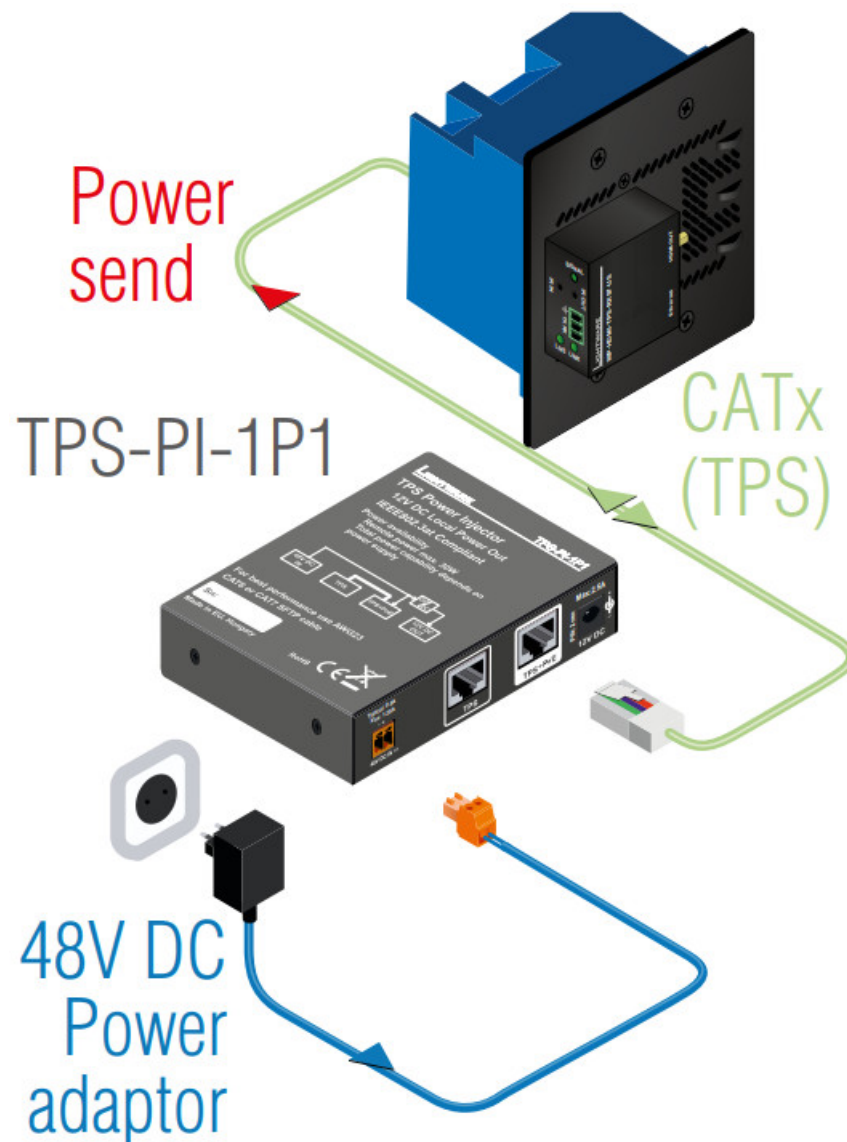
TPS-97 extenders are compatible with IEEE 802.3af standard – Power over Ethernet (PoE) – and can receive power over the TPS line.

The extender can be powered by any of the following ways:

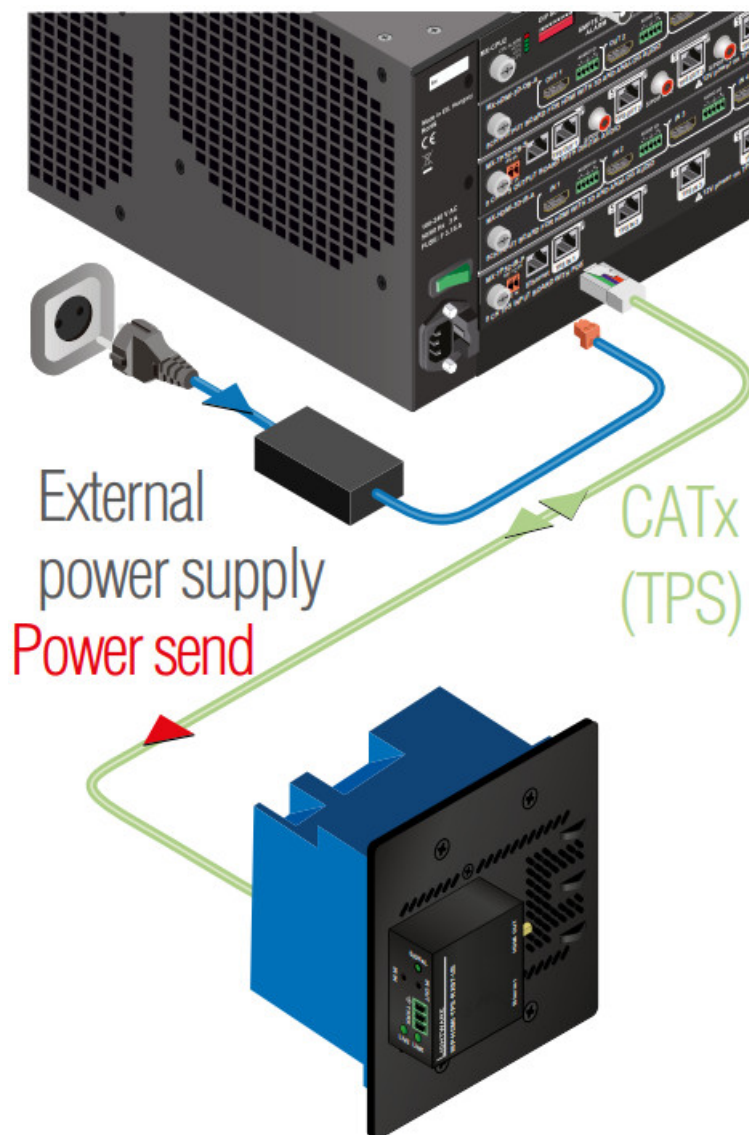
1. Local adaptor



2. Remote power injector



3. Matrix board



i TPS-TX/RX90 and TPS-TX/RX95 are not PoE-compatible, thus not able to remote power the WP/FP-HDMI-TPS-RX97 series and vica versa. WP/FP-UMX-TPS-RX97 series contains PoE-compatible remote power function (PD, Powered Device), RX95 and TX95 extenders can be remote powered only by each other.

! Warranty void if damage occurs due to the usage of a different power source.

Assembly Guide of the Bare Extender and the Front Plate

! Always apply ESD-protection during the assembling. Electric discharge may harm the electric parts of the device.

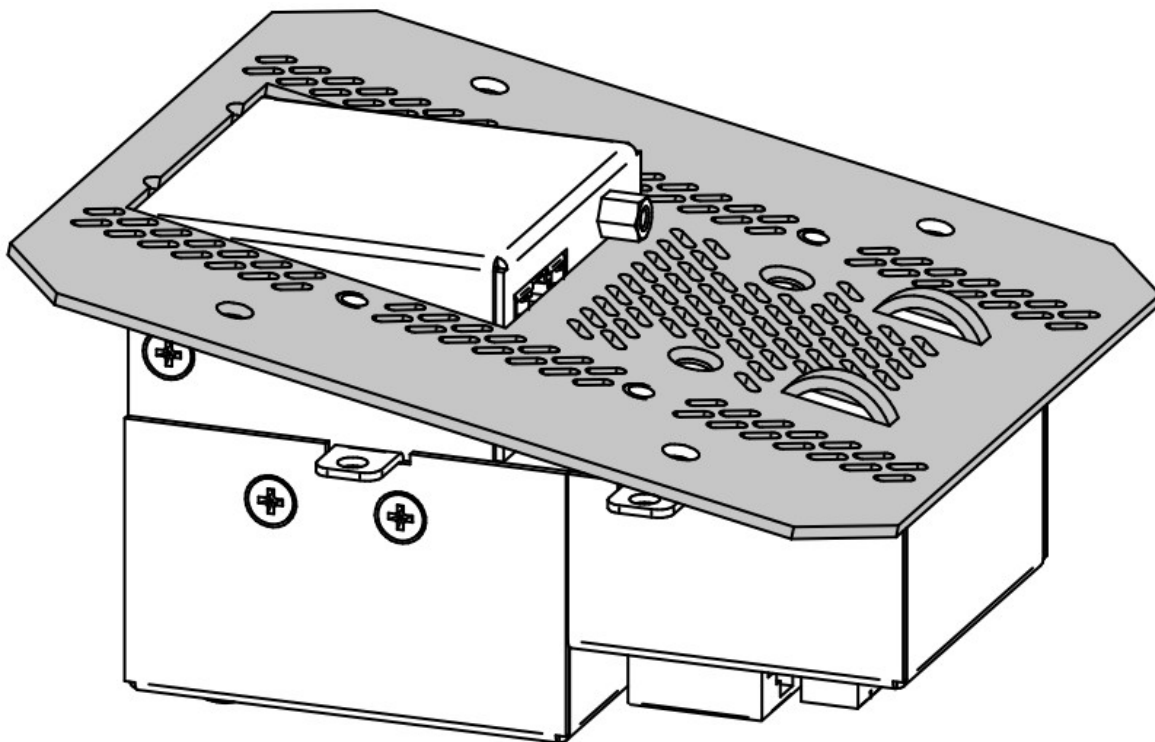
! Please unplug all cables from the device before performing the steps described below.

The following assembly steps can be applied for the following extender models and front plates:

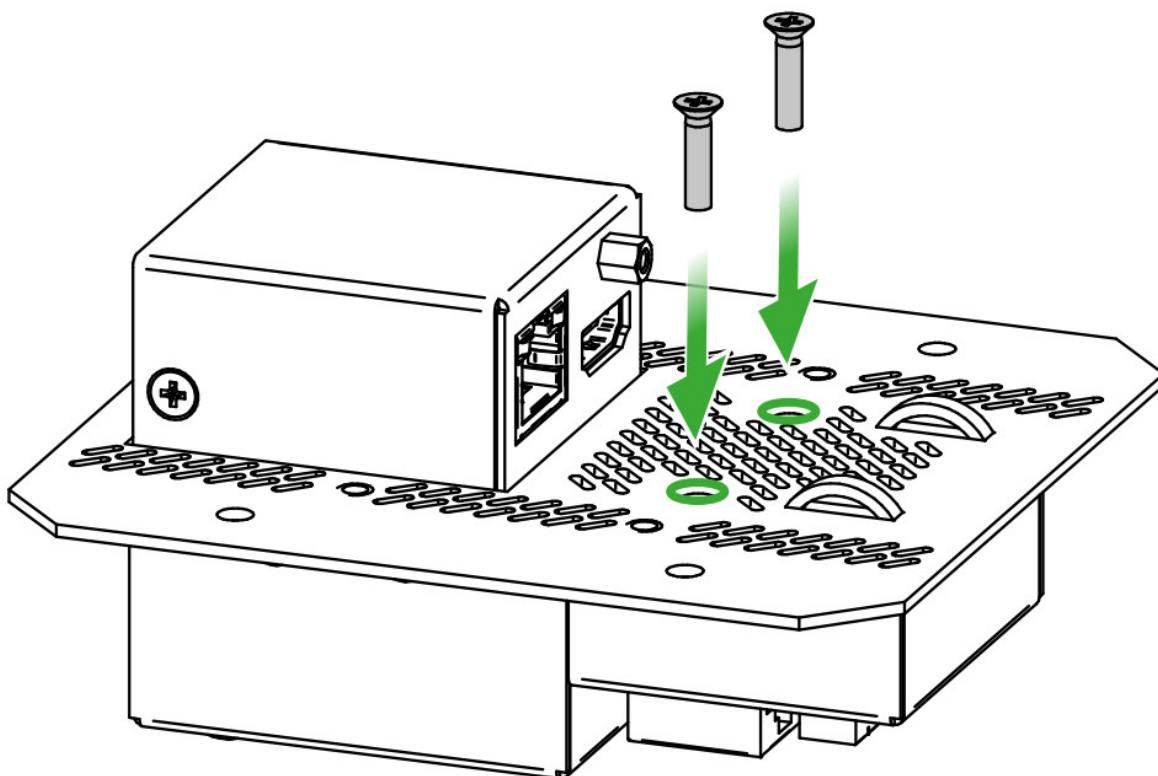
Name	Type	Description
WP-HDMI-TPS-RX97 bare	Extender	WP-HDMI-TPS-RX97 receiver device
WP-HDMI-TPS EU plate	Accessory	Front plate suitable for Double EU wall box
WP-HDMI-TPS UK plate	Accessory	Front plate suitable for Double UK wall box
WP-HDMI-TPS US plate	Accessory	Front plate suitable for Double US wall box
WP-HDMI-TPS FP-8AT plate	Accessory	Front plate suitable for Legrand 8AT floor box

Assembly Steps

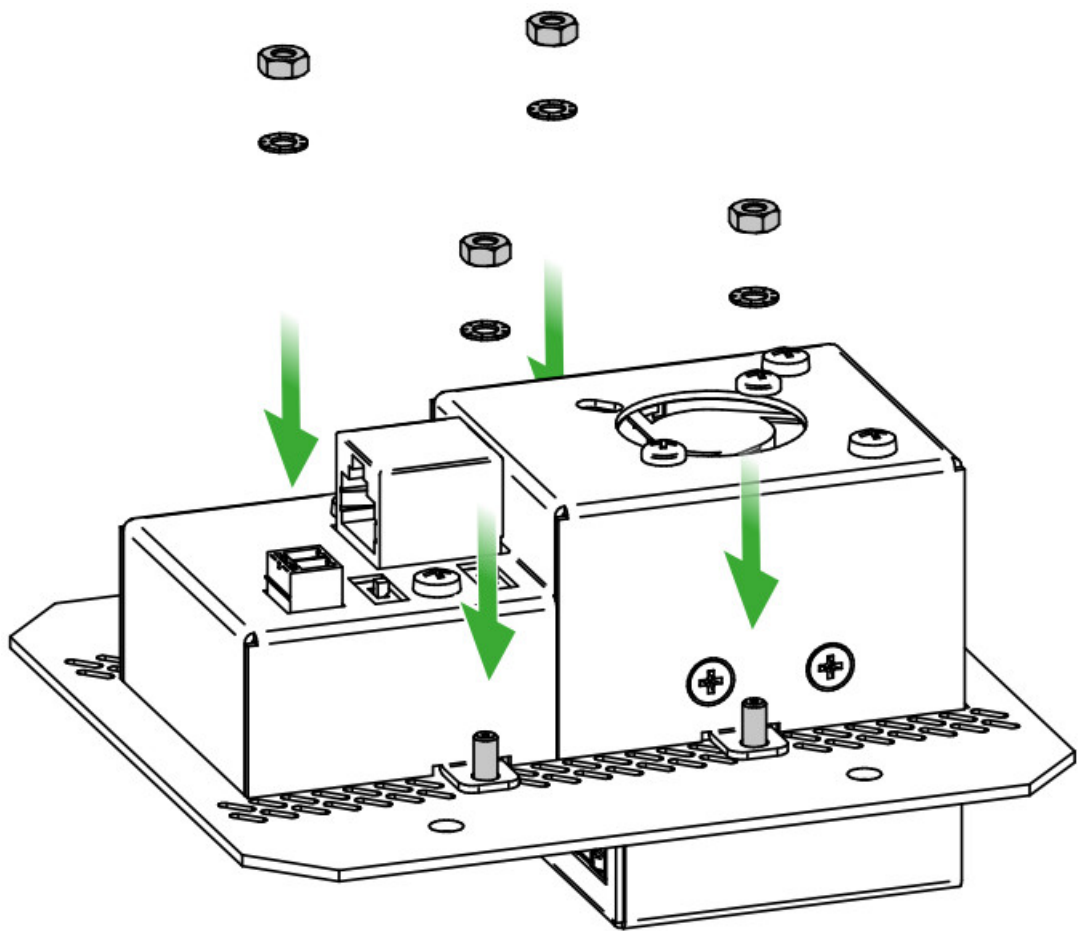
1. Place the front plate to the bare extender device like it is shown on the figure below. Place the cutout of the front plate under the HDMI flange screw.
2. Suit the front plate like it shall be lying down the device.



3. Place and screw the provided two pieces M3x12 PZ flat head black screws into the screw holes shown in the figure below. It requires a PZ1 screwdriver.

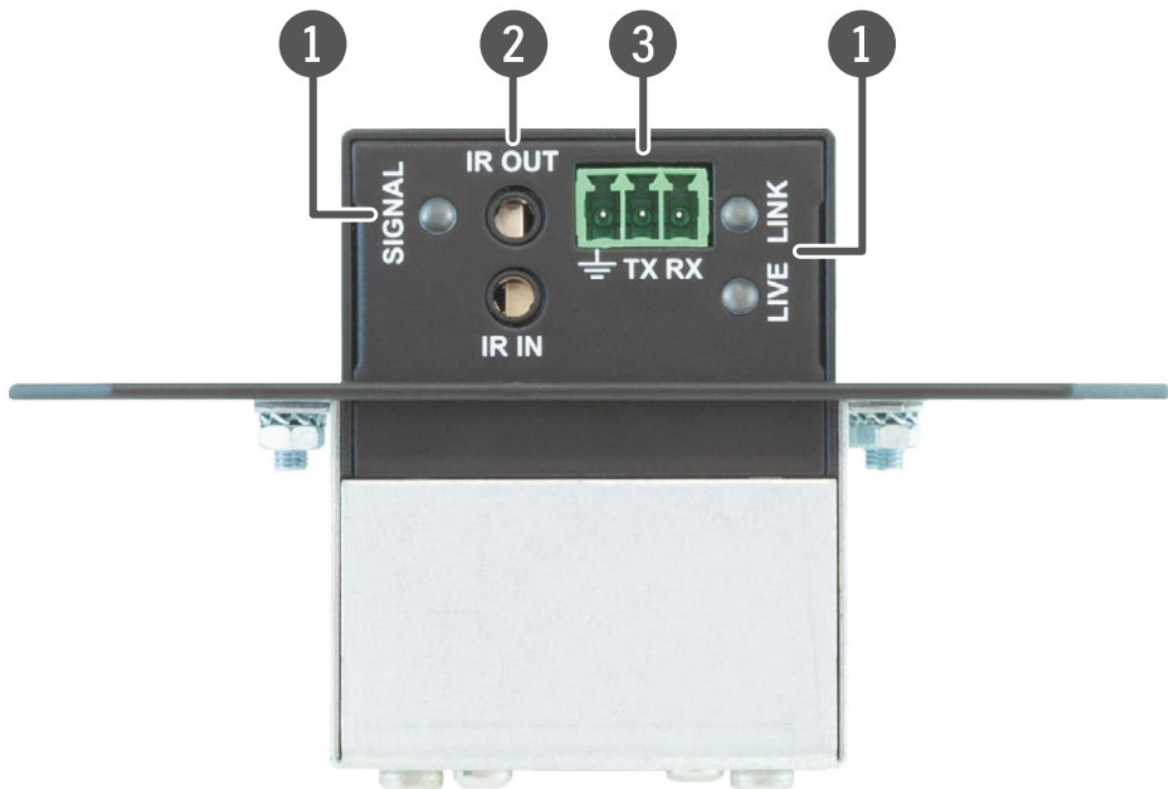


4. Turn the device upside down.
5. Place provided four pieces M3 bright zinc plated toothed washers to the screws. After it is done, place and screw four pieces M3 metric nuts onto the built-in screws with a 5,5mm socket wrench key.

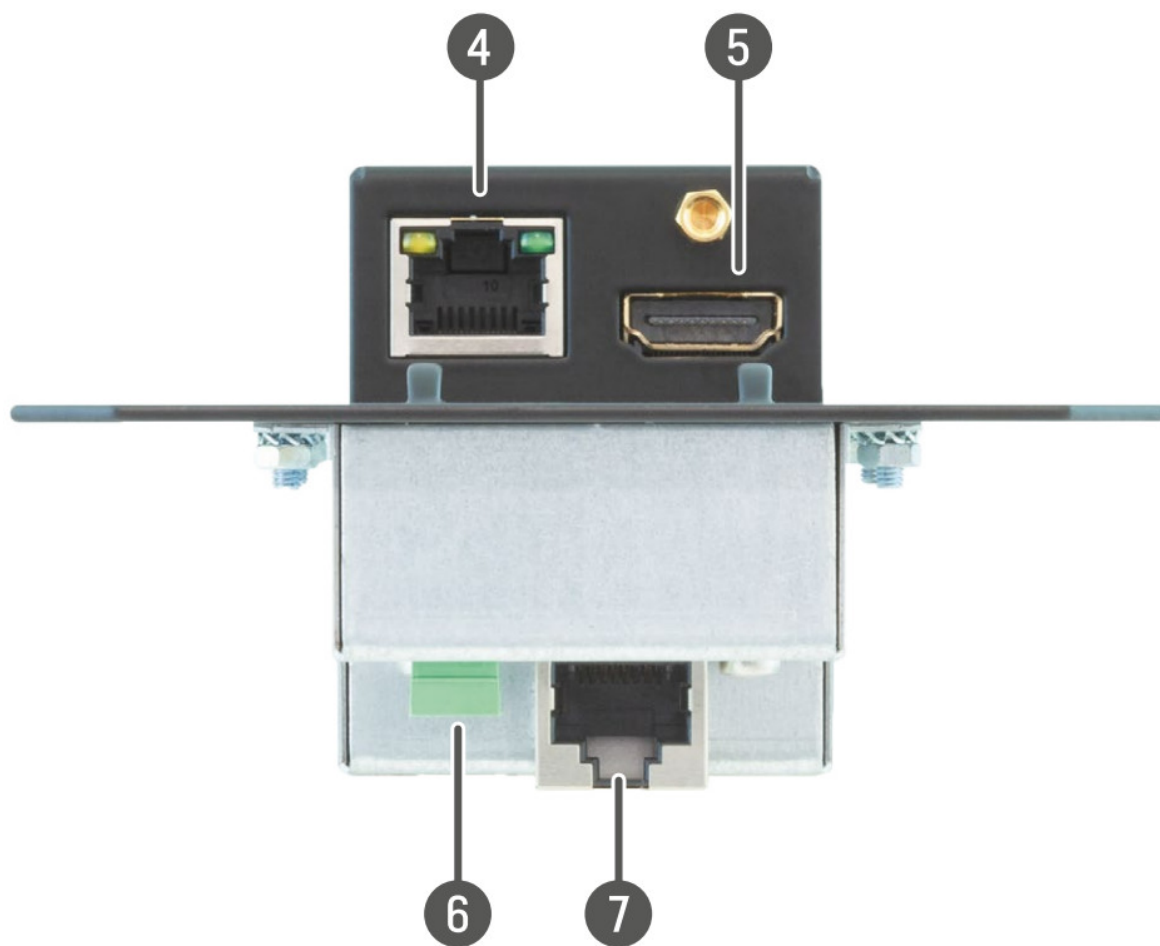


i Find more details about the assembly steps of the extender and the mounting options to the wall plates / floor plates in our Mounting Options and Accessories for WP/FP-HDMI-TPS-97 series Extenders assembly guide on the website www.lightware.com.

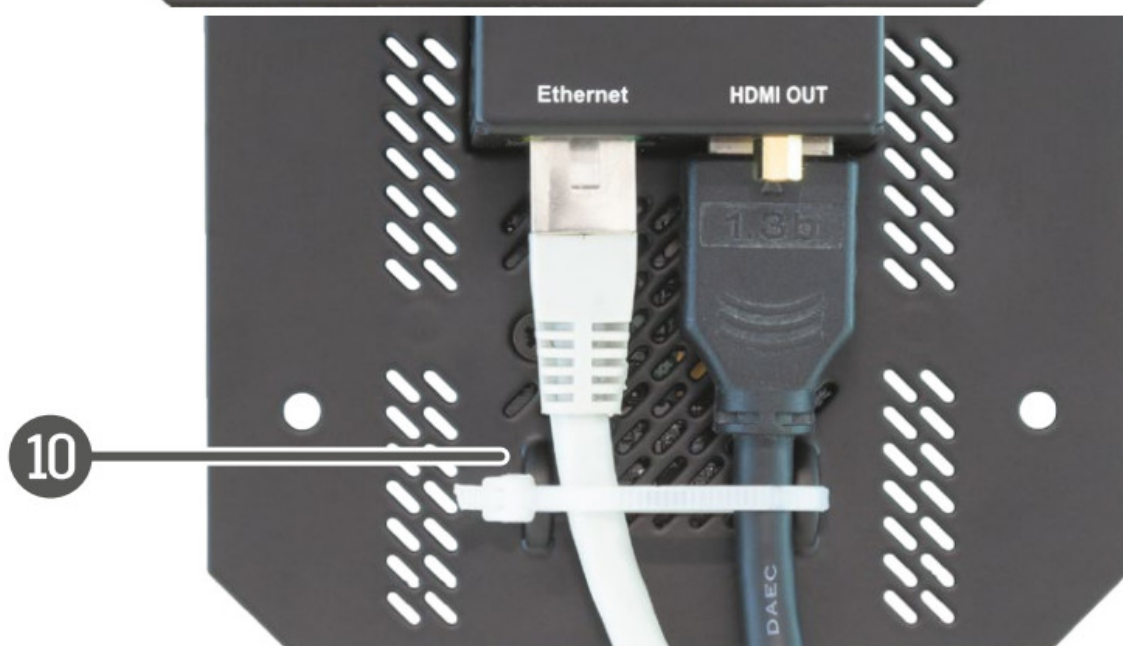
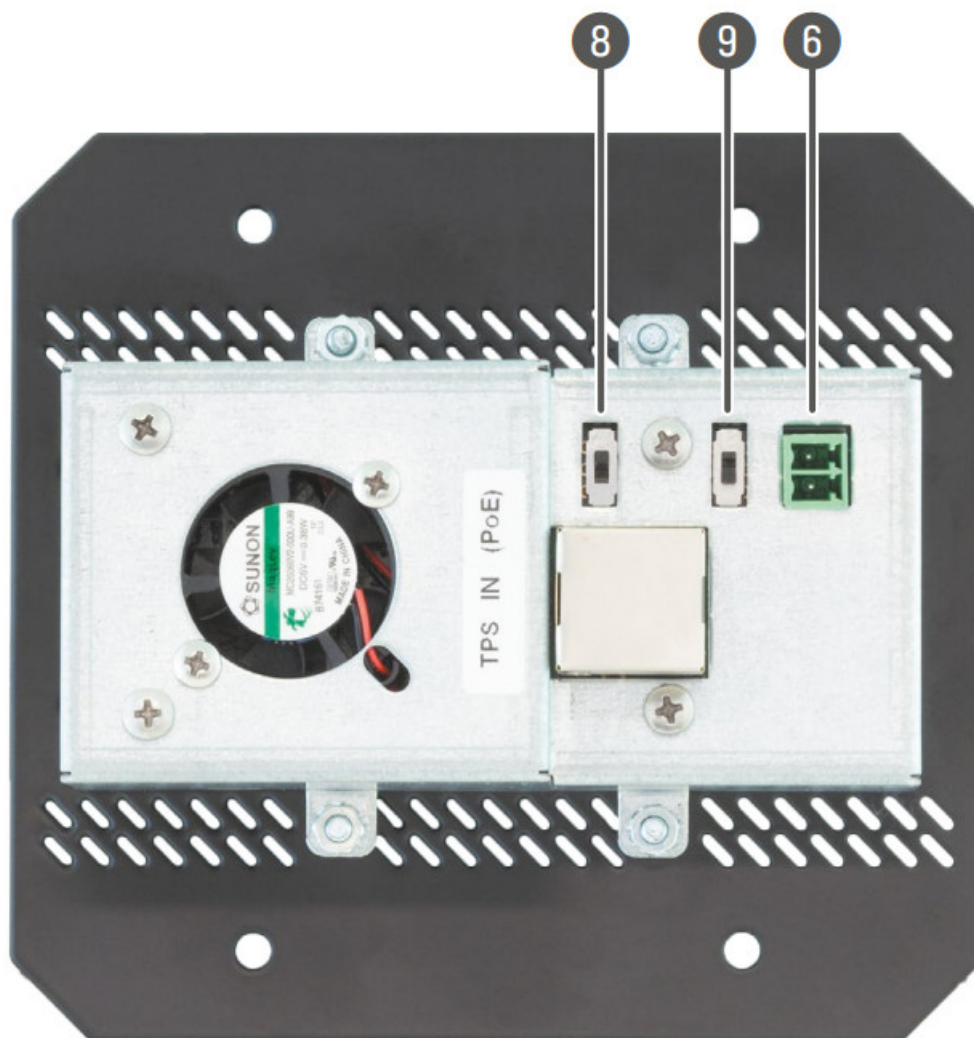
Front View (WP-HDMI-TPS-RX97-FP-8AT model)



Rear View (WP-HDMI-TPS-RX97-FP-8AT model)



Bottom View (WP-HDMI-TPS-RX97-FP-8AT model)



1	Status LEDs	The LEDs give feedback about the state of the unit and the video signals.	
	SIGNAL	● off	No video signal transmission.
		● on (green)	Video signal transmission is active.
	LINK	● off	TPS connection failed between the extenders.
		● blinking (green)	TPS connection is detected and Low Power Partial Functionality (LPPF) link mode is active.
		● on (green)	TPS connection is detected and HDBaseT™ (HDBT) or Long reach (LR) link mode is active.
	LIVE	● off	Device is not powered.
		● blinking (green)	Device is powered and ready to use.
2	IR input/output	2 TRS (3.5mm jack) connectors for Infrared units (IR IN for the detector, IR OUT for the emitter).	
3	RS-232 connector	3-pole Phoenix connector for RS-232 serial port. Firmware upgrade can also be performed over this interface. 3-pole Phoenix connector for RS-232 serial port. Firmware upgrade can also be performed over this interface.	
4	Ethernet	Locking RJ45 connector for Ethernet communication.	
5	HDMI output	HDMI output for DVI or HDMI signal. Connect an HDMI cable between the receiver and the display device.	
6	DC Input	Connect the output to the 2-pole Phoenix connector on the bottom of the wall plate.	
7	TPS input	Locking RJ45 connector for HDBaseT™ signal transmission. Connect a twisted pair cable between the transmitter and the receiver.	
8	RS-232 switch	Normal: serial data is passed through the device. Prog: RS-232 pass-through function is disabled, the device is ready for the firmware upgrade (see RS-232 switch modes section for details).	
9	TPS mode switch	LR: Longreach TPS mode; lower resolution (max 1080p), longer distances. Auto: TPS mode is determined automatically.	
10	Tie-down point	The built-in tie-down points are designed to clamp the HDMI and the CATx cable and ensure stable connection. Please see the enlarged picture below.	

Compatible Devices

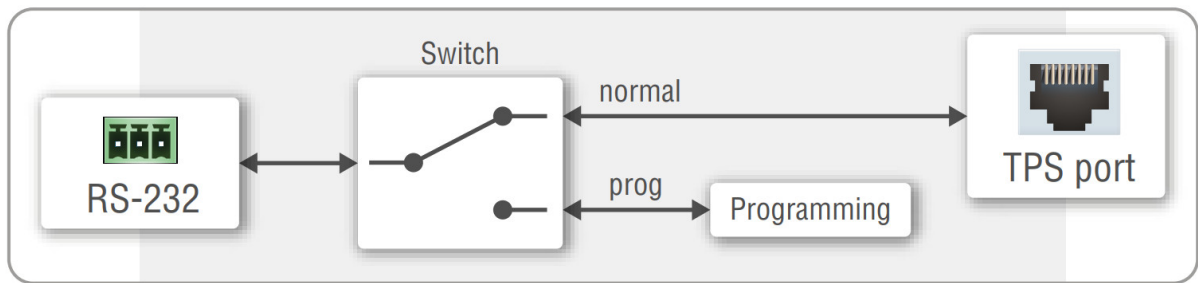
TPS-97 extenders are compatible with all Lightware devices with TPS port except the TPS-90 series.

The product is compatible with any HDBaseT™ third party devices.

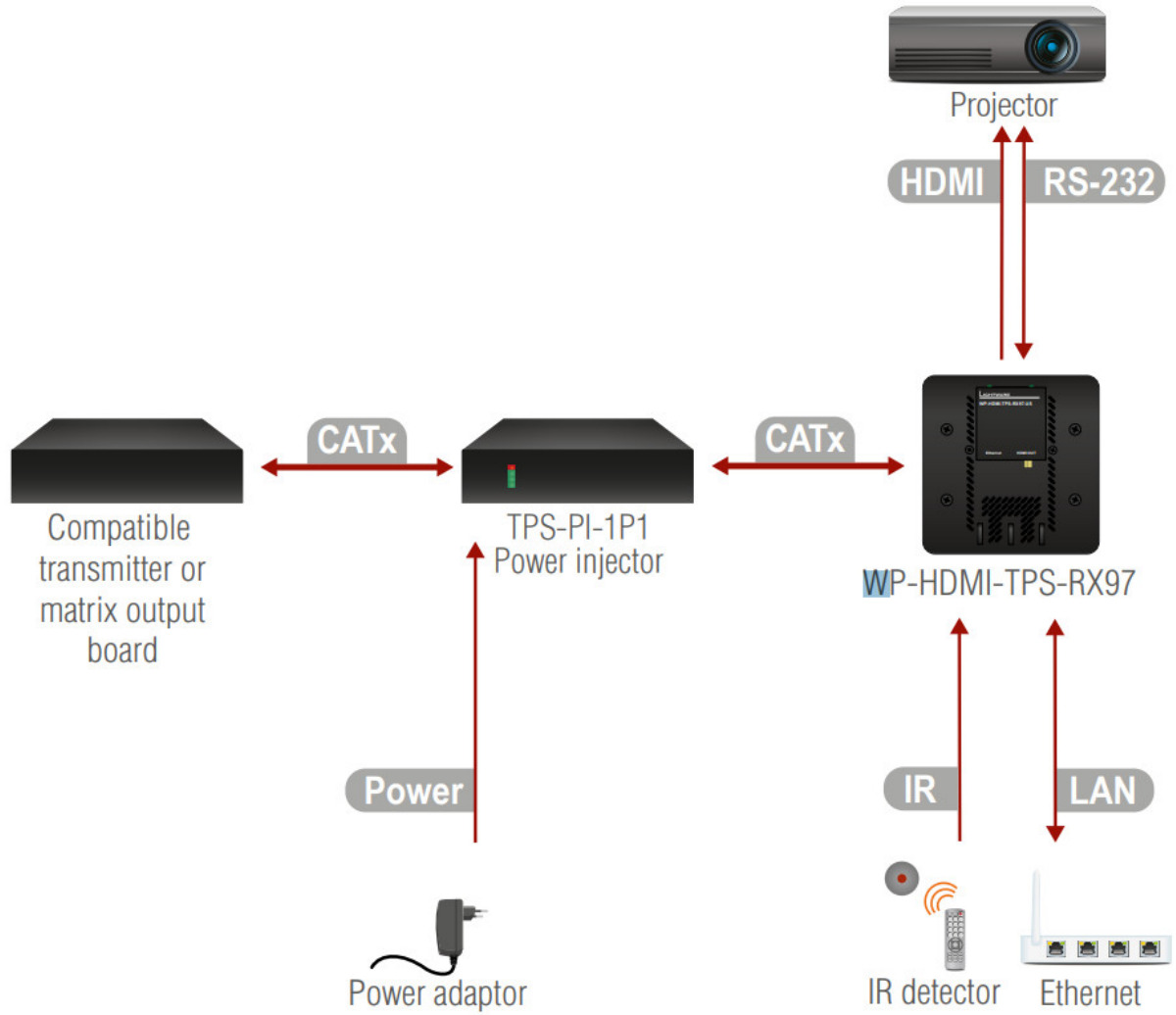
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RS-232 Switch Modes

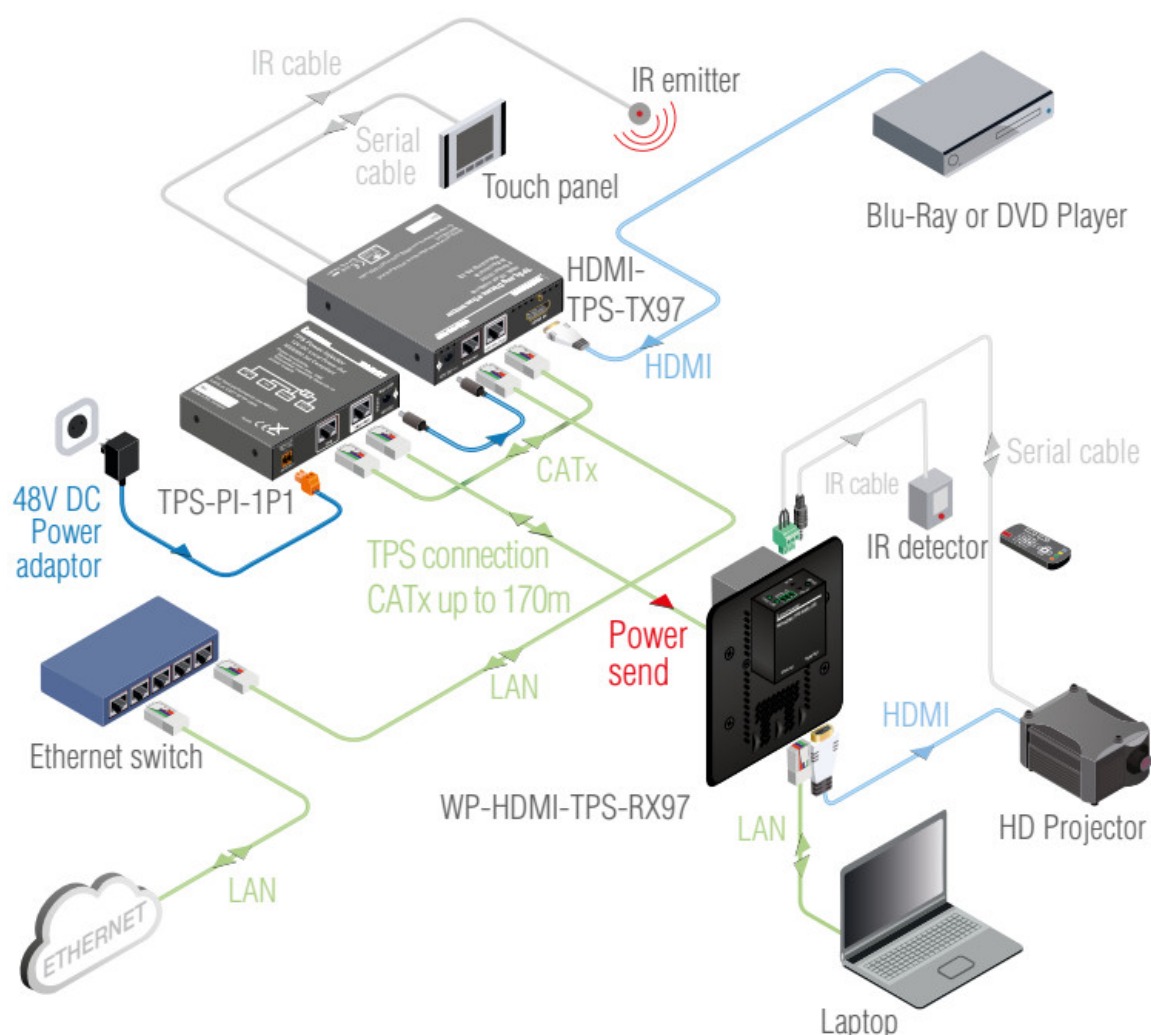


Connecting Steps



CATx	Connect the TPS input port of the receiver to the TPS+PoE port of the TPS-PI-1P1 by a CATx cable. Connect the receiver (or the matrix output board) to the power injector by a CATx cable via the TPS port.
HDMI	Connect the sink (e.g. Projector) to the HDMI output port by HDMI cable.
RS-232	Optionally for RS-232 extension: connect a controller/controlled device (e.g. Projector) to the RS-232 port.
IR	Optionally for Infrared extension: <ul style="list-style-type: none"> • Connect the IR emitter to the IR OUT port of the receiver, and/or • Connect the IR detector to the IR IN port of the receiver.
LAN	Optionally connect the receiver to a LAN.
Power	Powering on the devices is recommended to do as the final step during the installation. Please check the Power Supply Options section for the details.

Typical Application



TPS Link Modes

The TPS working mode between the transmitter and the receiver parties is determined by the mode set in them. Both parties influence on the setting which determines the final TPS transmission mode. The following TPS modes are defined:

- Long reach (LR): Longer CATx cable length, less bandwidth (limited resolution). The LPPF mode is not

available in LR TPS link mode.

- HDBaseT™ (HDBT): more bandwidth (higher resolutions), shorter CATx cable length. If no video present, the units change to LPPF mode automatically.
- Low Power Partial Functionality (LPPF): Only Ethernet, RS-232 and IR are extended.

Toggling between TPS link modes

The toggle switch on the extenders can be used to toggle between the LR and Auto TPS modes. If both units have Auto state and there is valid video signal on the transmitter the common mode will be HDBT. If the video signal disappears devices go into LPPF mode.

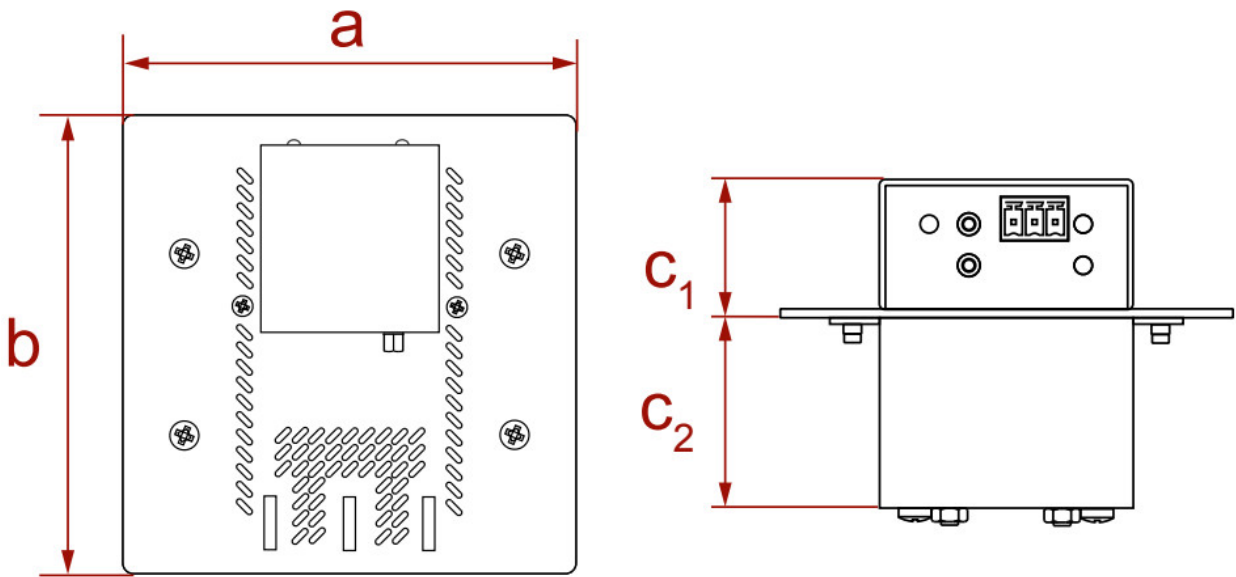
The negotiated TPS working mode		Selected mode (RX)	
		LR	Auto
Selected mode (TX)	LR	LR	LR
	Auto	LR	HDBT

TPS mode between an extender and a port of a matrix board

If an extender and a TPS matrix board are paired the board forces the extender to use the settings of the matrix. The extender’s TPS mode switch has no effect.

i Always use the Auto mode with third-party devices.

Dimensions

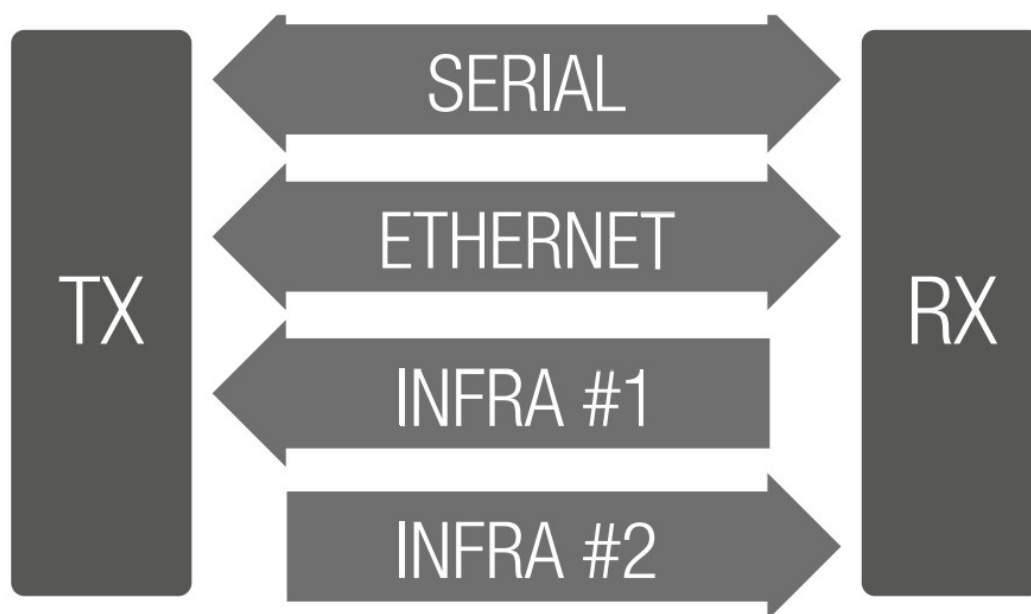


Receiver and Front plate model	Dimensions (mm)				Recommended outlet box type for mounting
	a	b	c1	c2	
WP-HDMI-TPS-RX97-EU	80	150	24,5	33,4	European two gang panel Part no.: 77190-D3
WP-HDMI-TPS-RX97-UK	80	140	24,5	33,4	Appleby galvanised steel knockout boxes 2g 47mm
WP-HDMI-TPS-RX97-US	114.3	115.9	24,5	33,4	Carlson B225R
WP-HDMI-TPS-RX97-FP-8AT	104,5	111,5	24,5	33,4	Legrand 8AT
FP-HDMI-TPS-RX97-GB3	44.8	134.5	24,5	33,4	OBO Bettermann: UT4; Part no.: 74 08727 Cover plate: OBO Bettermann UT4 P3; Part no.: 7408 76 1 Legrand 89610

Bidirectional Pass-through Data Lines

The direction of the video extension is fixed from TX towards RX but the pass-through data lines are bidirectional*. It means the RS-232, IR, Ethernet source and sink devices can be connected either to the TX or to the RX and the signal is transmitted to the other extender.

* In fact IR transmission is uni-directional but the extender has two IR channels with different directions.



RS-232

Third party devices with standard RS-232 port are supported as the extenders work in „passthrough” mode. TX and RX provide 3-pole Phoenix connector. The RS-232 options – the baud rate and the parity bits are set on the third party devices and it can be anything. The extenders support any kind of serial settings.



Please find the RS-232 device type in its user guide; the extenders work as DCE devices.

Ethernet

The Ethernet port on the RX or on TX can be connected to a LAN hub, switch or router with a LAN cable. The other side behaves as an Ethernet uplink port. The extenders support 10/100 Mbps data transfer rate. The Ethernet port has auto crossover function. It is able to recognize and handle both cable types: patch and cross TP cables.

Infrared (IR)

One emitter and one detector is enough for remote controlling one IR sink device. If there is an IR sink device to be controlled next to the TX and the other one is next to the RX, two emitter-detector pairs are needed. The IR

emitter and the detector have standard 3.5 mm TRS (jack) connectors. The emitter's plug has two poles (mono) and the detector's plug has three poles (stereo).

i The emitter and detector pair is not supplied with the product, it can be ordered from Lightware separately.
Types of IR Connectors (1/8" TS / TRS)

 <p>Detector – 3-pole-TRS</p>		 <p>Emitter – 2-pole-TS</p>	
1 Tip	Signal (active low)	1 Tip	+5V
2 Ring	GND	2 Ring	Signal (active low)
3 Sleeve	+5V	3 Sleeve	

Maximum Extension Distances

Below values are valid when the receiver is powered by a local adaptor; distances may decrease depending on the powering mode (local or remote) and cable quality.

Resolution	Pixel clock rate	Cable lengths (Auto / Long reach TPS mode)		
		CAT5e AWG24	CAT7 AWG26	CAT7 AWG23
1024×768@60Hz	65 MHz	100 m / 130 m*	90 m / 120 m*	120 m / 170 m*
1280×720p@60Hz	73.8 MHz	100 m / 130 m*	90 m / 120 m*	120 m / 170 m*
1920×1080p@60Hz (24bpp)	148.5 MHz	100 m / 130 m*	90 m / 120 m*	120 m / 170 m*
1920×1200@60Hz	152.9 MHz	100 m / NA	90 m / NA	120 m / NA
1600×1200@60Hz	162 MHz	100 m / NA	90 m / NA	120 m / NA
1920×1080@60Hz (36bpp)	222.75 MHz	70 m / NA	70 m / NA	120 m / NA
3840×2160@30Hz UHD **	297 MHz	70 m / NA	70 m / NA	100 m / NA
4096×2160@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.

i CAT7 SFTP AWG23 cable is always recommended.

Wiring Guide for RS-232 Data Transmission

WP/FP-HDMI-TPS-RX97 series 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
<p>2: TX data transmit 3: RX data receive 5: Ground</p>	<p>2: TX data receive 3: RX data transmit 5: Ground</p>

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

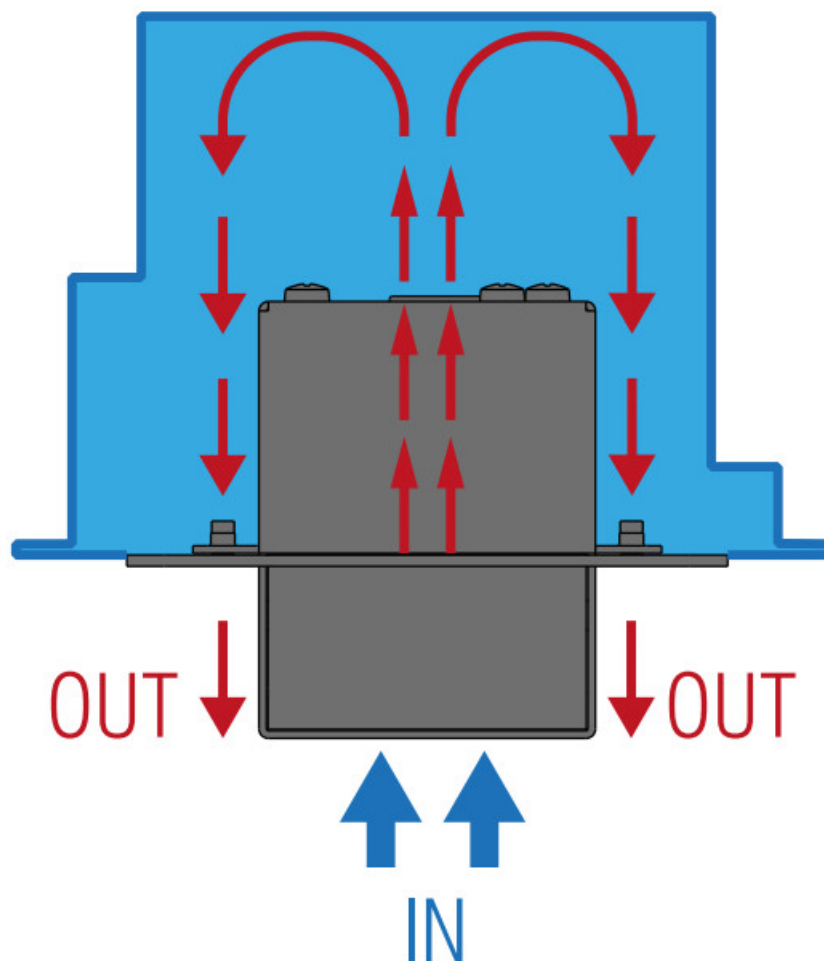
Specifications

General	
Compliance	CE, UKCA
Electrical safety	EN 62368-1:2014
EMC (emission)	IEC/EN 55032:2015
EMC (immunity)	IEC/EN 55035:2017
RoHS	EN 63000:2018
Warranty	3 years
Operating temperature	0° to +50°C (+32° to +122°F)
Cooling	by a cooling fan
Weight	approx. 370g (0.82 lb)
Power	
Power supply	external power adaptor / PoE (IEEE 802.3af) via TPS
Power adaptor	Input 100-240 V AC 50/60 Hz, Output 48V DC, 0.5 A
Power consumption	6.5W (typ) / 8W (max)
DC power connector	2-pole Phoenix connector
Connectors	
RX input	RJ45 (TPS interface)
RX output	HDMI connector
Ethernet	RJ45
IR input, output	3.5 mm (1.8") jack connector
Serial port	3-pole Phoenix
Digital video signal	
Supported signals	DVI 1.0, HDMI 1.4
Signal standard	DVI and HDMI standard which supports embedded audio
Supported resolutions	up to 4K / UHD (30Hz RGB 4:4:4, 60Hz YCbCr 4:2:0)
	1920×1080@120 Hz, 24 bit
3D support	yes
HDCP compliant	yes
Control over CEC	yes, only over HDMI signal
EDID support	transparent
Equalization	adaptive, automatic

Ventilation

 To ensure the correct ventilation and avoid overheating mount the extender into an industrial standard

switch/outlet box. Let enough free space in front of the appliance and keep the ventilation holes free. The picture on the right side shows the direction of the airflow.



Further Information

The product brief and further information of this appliance is available at www.lightware.com. See the Downloads section on the on the dedicated product page.

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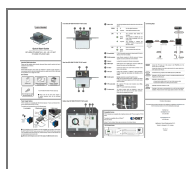
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Doc. ver.: 2.2

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Documents / Resources



LIGHTWARE TPS-RX97 Series Twisted Pair Hdbase [pdf] User Guide

WP-HDMI-TPS-RX97, WP-HDMI-TPS-RX97-EU, WP-HDMI-TPS-RX97-UK, WP-HDMI-TPS-RX97-US, WP-HDMI-TPS-RX97-FP-8AT, FP-HDMI-TPS-RX97-GB3, TPS-RX97 Series Twisted Pair Hdbase, TPS-RX97 Series, Twisted Pair Hdbase, Pair Hdbase, Hdbase

References

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