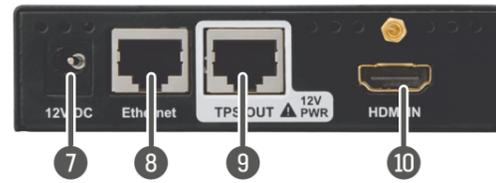**v i s u a l   e n g i n e e r i n g**
LIGHTWARE

Quick Start Guide

HDMI-TPS-TX95
HDMI-TPS-RX95
DVI-HDCP-TPS-TX95
DVI-HDCP-TPS-RX95

Front View

Rear View

ⓘ *The transmitters and the receivers have the same construction and connectors.*

The product is compatible with **HDBT** ™

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Front and Rear View – Legend

1	**RS-232 port**	Local RS-232 port for bidirectional serial data connection and performing firmware upgrade (programming).
2	**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.
3	**Status LEDs**	See the next section.
4	**TPS mode switch**	**LR**: Long reach TPS mode; lower resolution (max 1080p), longer distances; **Auto**: TPS mode is determined automatically.
5	**IR input**	IR signal input connector (for 3.5 mm Jack, 3-pole, TRS plug).
6	**IR output**	IR signal output connector (for 3.5 mm Jack, 2-pole, TS plug).
7	**DC input**	12V DC input for local power supply.
8	**Ethernet port**	The Ethernet data is passed through the device.
9	**TPS port**	TPS port to the other compatible device (extender / matrix / board).
10	**HDMI port**	Video port for DVI or HDMI signal.

Status LEDs

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

VIDEO
- OFF: no video signal transmission.
- ON: video signal transmission.

LINK
- OFF: TPS connection failed between the devices.
- BLINKING: TPS connection is detected and LPPF link mode is active.
- ON: TPS connection is detected and HDBT or LR link mode is active.

LIVE
- OFF: no power supply or out of order.
- BLINKING: device is powered and ready to use.

TPS link modes

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. For detailed information about the TPS link modes in case of matrix boards see the user's manual of the matrix.
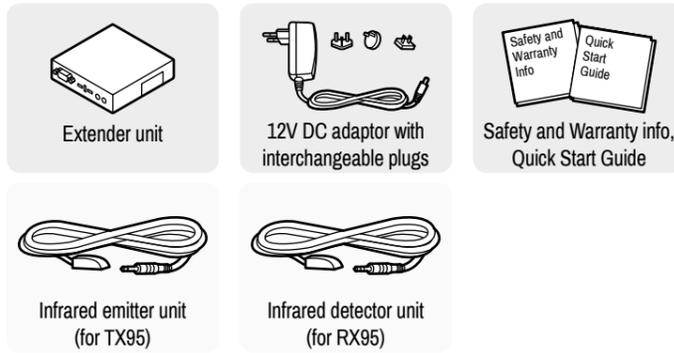
Important Safety Instructions

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

Introduction

The HDMI-TPS-RX/TX95 and DVI-HDCP-TPS-RX/TX95 are DVI 1.0 and HDMI 1.4 compatible long-distance extenders. The difference between HDMI and DVI-HDCP models is just the HDMI and DVI connector. The units offer bi-directional RS-232, Infra-Red (IR), and Ethernet signal pass-through on the same CAT5e...CAT7 cable that carries the uncompressed HDMI video and audio signal.

Box Contents

|		
Extender unit	12V DC adaptor with interchangeable plugs	Safety and Warranty info, Quick Start Guide
Infrared emitter unit (for TX95)	Infrared detector unit (for RX95)	

Remote Power Options

The TPS extenders can be powered remotely by its extender pair or a TPS matrix board. This feature can be enabled or disabled with jumper settings. Switch off the extenders. Loose the screws and remove the small plate from the right side of the enclosure. To enable the remote power function place the jumper block onto all the pinheads. To disable it place the jumper block onto the upper line pinheads only. In case of enabled remote power on both extenders the local adaptor can be placed at any side.

	TX side	RX side
Enabled		
Disabled (default)		
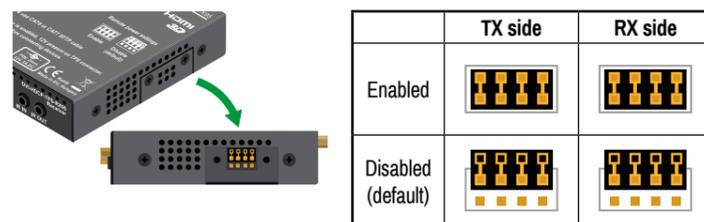
⚠ *The TPS remote powering must be used only with 95 series TPS extenders and MX TPS matrix boards. Using it with other devices may damage both units. Connecting incompatible devices with similar connectors may cause harm to the devices. Never connect any third party device to the extender with remote powering!*

ⓘ *AWG 26 cables are not recommended with remote powering (reduce cable distances).*

Connecting Steps
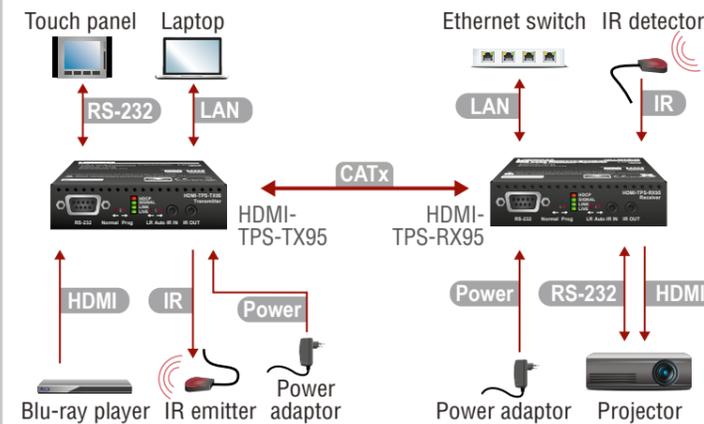
CATx	Connect the TPS output port of the **Transmitter** to the TPS input port of the **Receiver** by a CATx cable.
HDMI	Connect a source to the HDMI (DVI-D) input port of the transmitter.
IR	Connect an IR emitter unit to the IR output port of the transmitter.
RS-232	Connect a controller device to the local RS-232 port of the transmitter. Make sure the RS-232 switch is in **Normal** position.
LAN	Optionally connect a laptop to the Ethernet port of the transmitter.
HDMI	Connect a sink device to the HDMI (DVI-D) output port of the receiver.
RS-232	Connect a serial cable between the sink device and the RS-232 port of the receiver.
LAN	Connect the receiver to Ethernet by a CATx cable.
IR	Connect an IR detector unit to the IR input port of the receiver.
Power	Firstly connect the power adaptor to the DC input of the power injector, then secondly to the AC power socket.

Locking DC Plug

Twist 90° clockwise to lock.
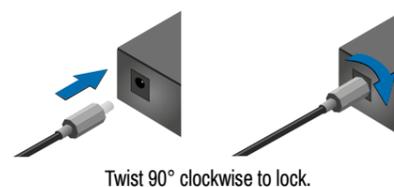
Mounting Options

Lightware offers three types of mounting accessory to fix the extenders:

Under Desk Mounting Kit (UD-kit)

The UD-kit makes easy to mount **one** extender under any flat surface (e.g. furniture).

UD Mounting Kit Double (UD-kit double)

The UD-kit double makes easy to mount **two** extenders under any flat surface (e.g. furniture).

Rack Shelf

1U high rack shelf provides mounting holes for fastening up to **four** extenders.

Mounting Steps

⚠ *Always use the fixing screws which are supplied with the mounting accessory. If you insert screws longer than 6 mm, the device can be damaged.*

1. Unplug all the cables connected to the device(s).
2. Turn the device(s) upside down.
3. Put the shelf upside down on the device(s). Position it to get the mounting holes aligned.
4. Fasten the device on the shelf with the provided screws.
5. Fix the shelf to the desired place (screws are not supplied).

Installation of the Extender with a Matrix

1. Power off all devices. (Installing with powered devices may harm them.)
2. Check the RS-232 switch(es) on the extender(s); they must be in Normal position.
3. The state of the TPS link mode switch makes no difference on the extender because the connected board forces the extender to use the settings of the matrix.
4. Set the remote power mode of the matrix boards with the jumpers on them. Every port can be set for remote powering separately. To enable the remote power function place the jumper block onto all the pinheads of the desired port. To disable it remove the jumper block. For detailed information, see the user's manual of the matrix..
5. Set the extenders' remote power mode with the same method as it mentioned in the standalone case.
6. Pair the extender(s) and the matrix board(s) with CATx cable(s). The transmitters' TPS OUT with the input boards' TPS IN and the receivers' TPS IN with the output boards' TPS OUT.
7. Connect the video source(s), sink(s) and the desired accessory device(s) to the matrix (MX-TPS boards don't support the IR pass-through).
8. Connect the video source(s), sink(s) and the desired accessory device(s) to the extenders.
9. Supply that matrix boards with 12V 6,67A DC which have ports with enabled remote powering.
10. Supply the extenders with 12V 2A DC. If the remote power is disabled on the connected matrix card's port, local adaptor must be used for the extender.
11. Connect the power cord of the matrix into the outlet and switch on the matrix.
12. Supply the other connected units.

Further Information

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

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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.

| HDCP |
| SIGNAL |
| LINK |
| LIVE |

LR Auto IR IN

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 switch has no effect.

ⓘ *Always use the Auto mode with third-party devices!*

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

Bi-directional Pass-through Data Lines

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

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. Extenders support 10/100 Mbit/sec data transfer rate. The direct access is also supported with cross-link cable. The Ethernet port has auto crossover function. It is able to recognize and handle both cable types: patch and cross TP cables.

RS-232

Third party devices with standard RS-232 port are supported as the extenders work in **pass-through** mode. TX and RX provide 9-pole D-sub female connector. Use straight-serial cable to connect a DTE device to an extender and use a cross serial cable in case of pairing a DCE device to the other TPS extender. 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 read the user's manual of the RS-232 device to get its type. The extenders work as DCE devices.*

Infra-Red (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).

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

ⓘ *The second emitter and detector pair can be ordered from Lightware separately.*
ⓘ *IR extension is available only with point-to-point connection of the extenders.*

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.

** AWG 26 cables are not recommended with remote powering.

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.

ⓘ *CAT7 SFTP AWG23 cable is always recommended.*

Typical Application

IR cable
Serial cable
Touch panel
IR emitter
Blu-ray player
HDMI-TPS-TX95
HDMI-HDMI cable
12V DC Power adaptor
LAN
Ethernet switch
LAN Internet
TPS connection CATx up to 170 m
IR detector
IR cable
Serial cable
LAN
HDMI-TPS-RX95
HD Projector
Projection screen

Specification

General

Compliance	CE
EMI / EMC	EN 55035:2017 / EN 55032:2015
Cooling	passive
Enclosure	1 mm steel
Dimensions	100.4 W x 100x4 D x 26 H mm
Weight (TX)	300 g (HDMI) / 310 g (DVI-HDCP)
Weight (RX)	320 g (HDMI) / 330 g (DVI-HDCP)

Digital Video Signal

Supported signals	DVI 1.0, HDMI 1.4
Signal standard	DVI and HDMI standard which supports embedded audio
Supported resolutions	1920x1080@120 Hz, 24 bit up to 4K / UHD (30Hz RGB 4:4:4, 60Hz YCbCr 4:2:0)
3D support	yes
HDCP compliant	yes
CEC support *	transparent
EDID support	transparent

*Only between HDMI-TPS-TX95 and HDMI-TPS-RX95 models.

Remote Power Options

The TPS extender can be powered remotely by the connected TPS matrix board or its extender pair. This feature can be enabled or disabled with jumper settings for every port separately. Switch off the matrix. Remove the desired cards. Pinheads are behind of the TPS connectors. To enable the remote powering function of the port place the jumper block onto all the corresponding pinheads. Connect the external 12V DC 6,67A power adaptor to the card separately. Finally, set the extenders' desired power modes. To disable the remote powering function for a port remove the jumper block from the corresponding pinheads.

Jumper Settings

Place the jumper blocks onto all the pinheads of those units which you want to be powered remotely. For disabling the remote powering remove the jumper blocks and place them onto the upper line pinheads only.
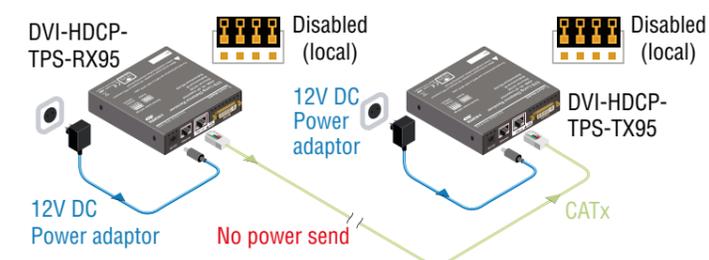
⚠ **Read carefully all the detailed instructions about remote powering devices! Never use remote powering with third-party units!**

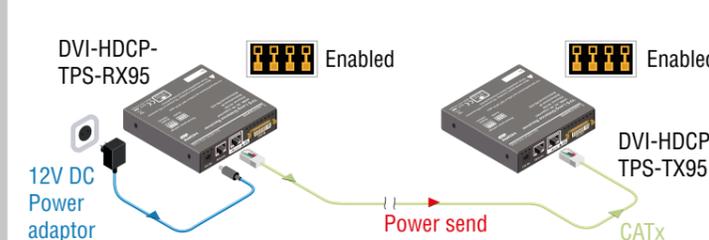ⓘ *AWG 26 cables are not recommended for remote powering (reduce cable distances).*

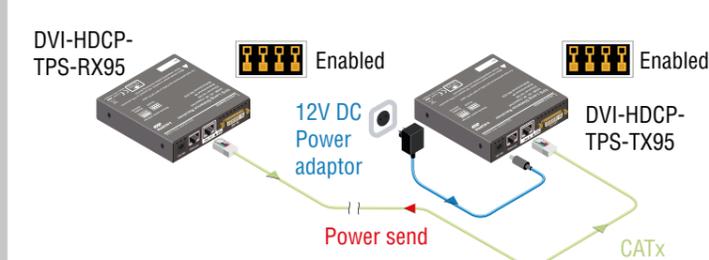ⓘ *For more information please download the User's Manual of the MX-FR matrix switchers.*

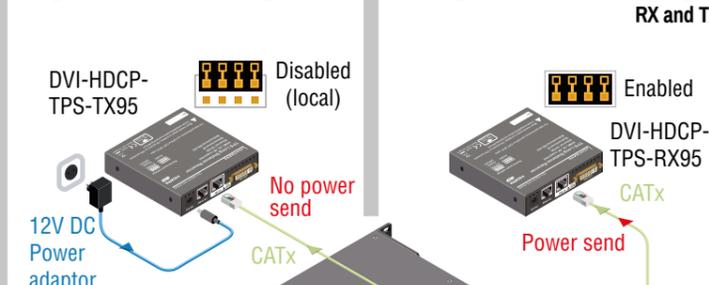| Cable length (HDMI/DVI input port)	max. 20 m
Equalization	adaptive, automatic

Power

Power supply	external power adaptor / remote power via TPS
Power adaptor	Input 100-240 V AC 50/60 Hz, Output 12V DC, 2.5 A
Power consumption (TX)	3.6W (typ) / 4.2W (max)
Power consumption (RX)	5.3W (typ) / 6.1W (max)

Connectors

TX input, RX output	HDMI / DVI-I connector
TX output, RX input	RJ45 (TPS interface)
Ethernet	RJ45
IR input, output	3.5 mm (1.8") jack connector
Serial port	9-pole D-sub
Power	locking DC connector (2.1 / 5.5 mm)

TPS port (HDBaseT™-compatible)

Ethernet pass-through	yes
RS-232 pass-through	yes
IR pass-through	yes

Standalone with Local Powering

DVI-HDCP-TPS-RX95 — Disabled (local)
Disabled (local) — DVI-HDCP-TPS-TX95
12V DC Power adaptor
12V DC Power adaptor
No power send
CATx

Standalone with Remote Powering for RX

DVI-HDCP-TPS-RX95 — Enabled
Enabled — DVI-HDCP-TPS-TX95
12V DC Power adaptor
Power send
CATx

Standalone with Remote Powering for TX

DVI-HDCP-TPS-RX95 — Enabled
Enabled — DVI-HDCP-TPS-TX95
12V DC Power adaptor
Power send
CATx

Integrated with Local Powering

DVI-HDCP-TPS-TX95 — Disabled (local)
12V DC Power adaptor
No power send
CATx

Integrated with Remote Powering for RX and TX

Enabled — DVI-HDCP-TPS-RX95
CATx
Power send

DVI-HDCP-TPS-TX95 — Disabled (local)
12V DC Power adaptor
CATx

Enabled
Enabled
Disabled

DVI-HDCP-TPS-RX95 — Enabled
CATx
Power send