visual engineering
LIGHTWARE

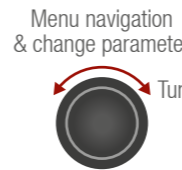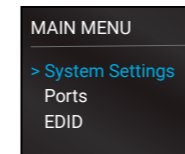## Quick Start Guide

MMX8x4-HT420M

Important Safety Instructions

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

Introduction

MMX8x4-HT420M is a standalone matrix switcher specifically designed for conference room environments. It has eight video inputs (4x HDMI, 4x TPS) and four video outputs (2x HDMI 2x TPS). 4K / UHD (30Hz RGB 4:4:4 or 60Hz YCbCr 4:2:0), 3D capabilities and HDCP are fully supported. MMX8x4-HT420M has a dedicated Special Audio Input block with input ports for microphone and line-in. The built-in sound mixer allows free mixing of the audio signals from the de-embedded HDMI, the microphone or the line-in.

Box Contents

Matrix Unit	Safety and Warranty Info, Quick Start Guide
IEC Power Connector	Phoenix Combicon 2-pole Connector (4x)	Phoenix Combicon 3-pole Connector (3x)
Phoenix Combicon 5-pole Connector (4x)	Phoenix Combicon 8-pole Connector (1x)	Infrared Emitter Unit with Phoenix Combicon 2-pole Connector (2x)
LAN straight-through Cable, CAT5e type, 0.25m length (2x)	Infrared Emitter Unit with Jack Connector (4x)	LAN Cross-Link Cable, CAT5e type, 3m length

Compatible Devices

The MMX8x4-HT420M matrix is compatible with other Lightware TPS devices, matrix TPS and TPS2 boards, 25G boards, as well as third-party HDBaseT-extenders, but not compatible with the phased out TPS-90 extenders.

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Front View

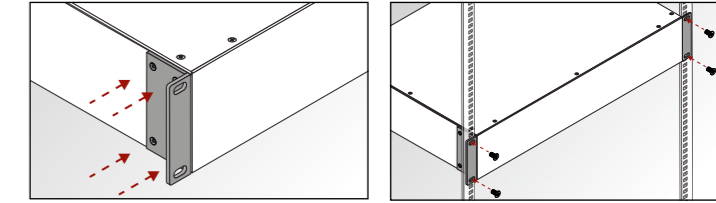|		
1	USB port	USB mini-B port for controlling the unit locally by Lightware Device Controller software.
2	POWER LED	on — Power LED indicates that the unit is powered on.
3	LIVE LED	blinking slow — The unit is on and operates properly. blinking fast — The unit is in bootload mode.
4	LCD screen	Displays the front panel menu. Basic settings are available.
5	Jog dial knob	Browse the menu by turning the knob, click on the desired item to check or change it.

LCD Menu and Navigation

The front panel has a color LCD showing the most important settings and parameters (E.g. network settings, port status, crosspoint state). The jog dial control knob can be used to navigate between the menu items or change the value of a parameter. The knob can be pressed to enter a menu or edit/set a parameter.
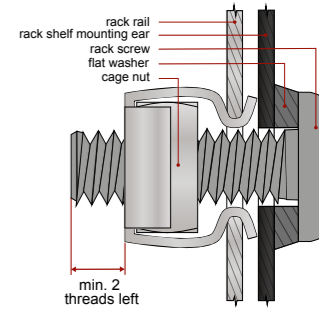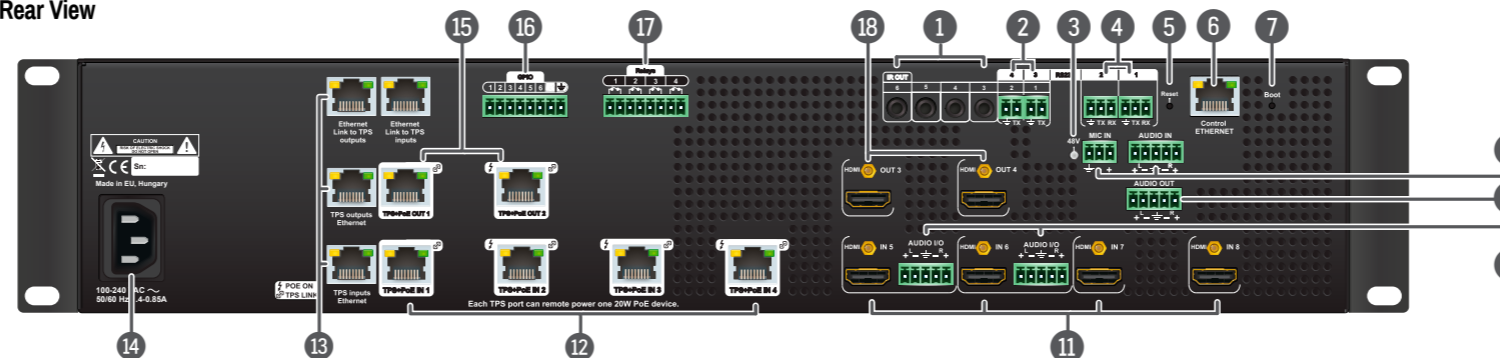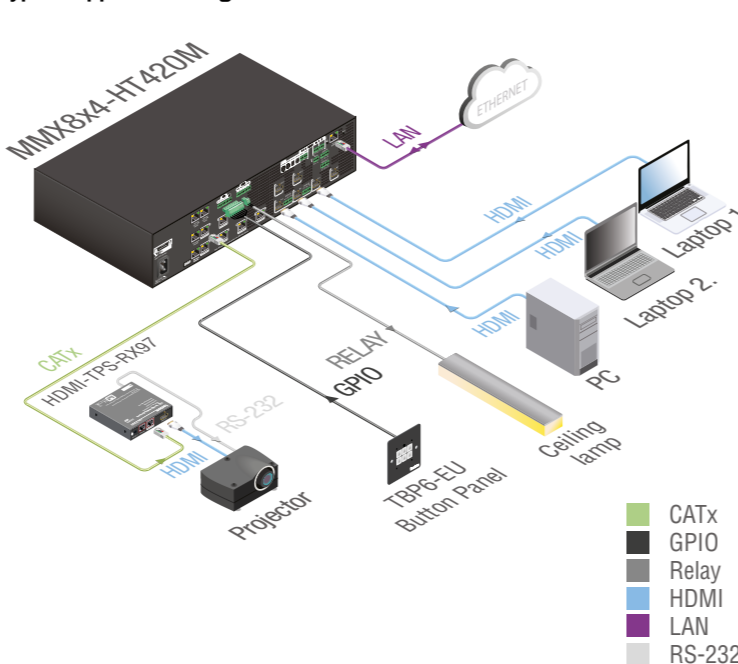
MAIN MENU
> System Settings
Ports
EDID

Menu navigation & change parameter — Turn

Menu selection & set parameter — Press

Rear View

1	Infra outputs	3.5 mm TRS (Jack) plugs for infra signal transmission.
2	Serial/Infra outputs	2-pole Phoenix connectors (2x) for IR output or TTL output serial signal.
3	48 V LED	on — Phantom power turned on. off — Phantom power turned off.

⚠ Turn off the phantom power before connecting the microphone!

4	RS-232 ports	3-pole Phoenix connectors (2x) for bi-directional RS-232 communication.
5	Reset button	Reset or power on the device while keep pushing the hidden button takes the matrix in bootload mode.
6	Ethernet port	RJ45 connector to control the matrix via LAN.
7	Boot button	Reset or power on the device while keep pushing the hidden button takes the matrix in bootload mode.
8	Analog audio inputs	3-pole Phoenix connector for microphone input and 5-pole Phoenix connector for balanced analog audio input.

9	Analog audio outputs	5-pole Phoenix connector for balanced analog audio; the signal can be mixed from the de-embedded audio of the TPS/HDMI inputs or the microphone input or the line in.
10	Audio I/O ports	5-pole Phoenix connector for balanced analog audio; depending on the configuration, it can be input or output. Output audio is the de-embedded HDMI signal from the nearby HDMI port.
11	HDMI inputs	HDMI input ports (4x) for sources.
12	TPS inputs	RJ45 connectors (4x) for incoming TPS signal; PoE-compliant.
13	TPS Ethernet	Locking RJ45 connector to supply Ethernet communication for the TPS lines – it can be separated from the LAN communication (controlling functions) of the matrix. Not PoE-compliant.
14	AC connector	Standard IEC connector accepting 100-240 V, 50 or 60 Hz.
15	TPS outputs	RJ45 connectors for TPS signal; PoE-compliant.
16	GPIO	8-pole Phoenix connector for configurable general purpose input/output ports.
17	Relay	8-pole Phoenix connectors for relay ports.
18	HDMI outputs	HDMI output connectors for sink devices.

Mounting Options - Standard Rack Installation

Two rack ears are supplied with the product, which are fixed on left and right side as shown in the picture. The default position allows mounting the device as a standard rack unit installation.

ℹ The matrix switcher is 2U-high and one-rack wide.

⚠ Always use all the four screws for fixing the device ears to the rack rail. Choose proper size screws for mounting. Keep minimum two threads left after the nut screw.

Ventilation

⚠ To ensure the correct ventilation and avoid overheating let enough free space around the appliance. Do not cover the appliance, let the ventilation holes free on both sides.

rack rail
rack shelf mounting ear
rack screw
flat washer
cage nut
min. 2 threads left

Typical Application Diagram

MMX8x4-HT420M

ETHERNET
LAN
HDMI
Laptop 1.
Laptop 2.
PC
HDMI-TPS-RX97
RELAY
GPIO
Ceiling lamp
RS-232
TBP6-EU Button Panel
HDMI
Projector

CATx
GPIO
Relay
HDMI
LAN
RS-232

Factory Default Settings

IP address	192.168.0.100
RS-232 port setting	57600 BAUD, 8, N, 1
Control protocol (RS-232)	LW2
Crosspoint setting	Input 1 on all outputs
I/O Ports	Unmuted, unlocked
TPS mode	Auto
PoE enable	Enable
HDCP enable (input)	Enable
HDCP mode (output)	Auto
Signal Type	Auto
Emulated EDID	F47 - (Universal HDMI, all audio)
Audio mode	HDMI audio passthrough
MIC input levels	Volume (dB): 0.00; Panorama (Balance): 0; Gain (dB): 0.00
Analog audio input levels	Volume (dB): 0.00; Balance: 0; Gain (dB): 0.00
Analog audio output levels	Volume (dB): 0.00; Balance: 0

Remote Powering (PoE)

The matrix is PoE-compatible (in accordance with IEEE 802.3af standard) and able to send remote power to connected TPS devices via the TPS connection (through the CATx cable). No local power adaptor is required for the connected PoE-compatible TPS extender. The PoE feature is enabled on TPS ports as factory default.

Further Information

The document is valid with the following firmware version: 1.0.1
The User's manual of this appliance is available on www.lightware.com.
See the Downloads section on the website of the product.

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Installation Guide for Connecting a Microphone

These settings can be done from a computer using the Lightware Device Controller (LDC) software. The application is available at www.lightware.com, install it on a Windows PC or a Mac OS X and connect to the device via LAN, USB, or RS-232.

1. Before the connection, please set these properties below:

Port	Property	Value	Lightware Device Controller
Analog audio output (BAL. OUT)	Volume	-80dB and/or Mute	-80 / -80 dB
Microphone input (MIC IN)	Volume	-80dB and/or Mute	-80 / -80 dB

⚠ *Skipping the volume or mute setting can cause serious damage in the speaker or the external sound system when phantom power is turned on!*

| | Phantom power | Turn off | +48V |

⚠ *Always turn off the phantom power before connecting the microphone!*

Port	Property	Value	Lightware Device Controller
Microphone input (MIC IN)	Input gain	-12dB	GAIN -12 dB, -12 ... +55
	EQ (High,Hmid, Lmid, Low)	0	0 dB, -18 ... +18
	Panorama	0	PAN 0, L ... R

2. Connect the microphone.
   a. In case of **dynamic or wireless microphone**: skip this step and follow the instructions with step 3.
   b. In case of **condenser microphone**: Switch on the phantom power. Keep pressed the +48V button more than 2 seconds to activate phantom power.

   ⚠ *Phantom power supplies the condenser microphone by 48V which is necessary for normal operation. Application of the phantom power can cause a damage if dynamic or wireless microphone is connected!*

   ⓘ *Always switch on the phantom power when the cabling and connecting have already done. Do not disconnect the microphone when the phantom power is switched on!*

3. Set these properties below:

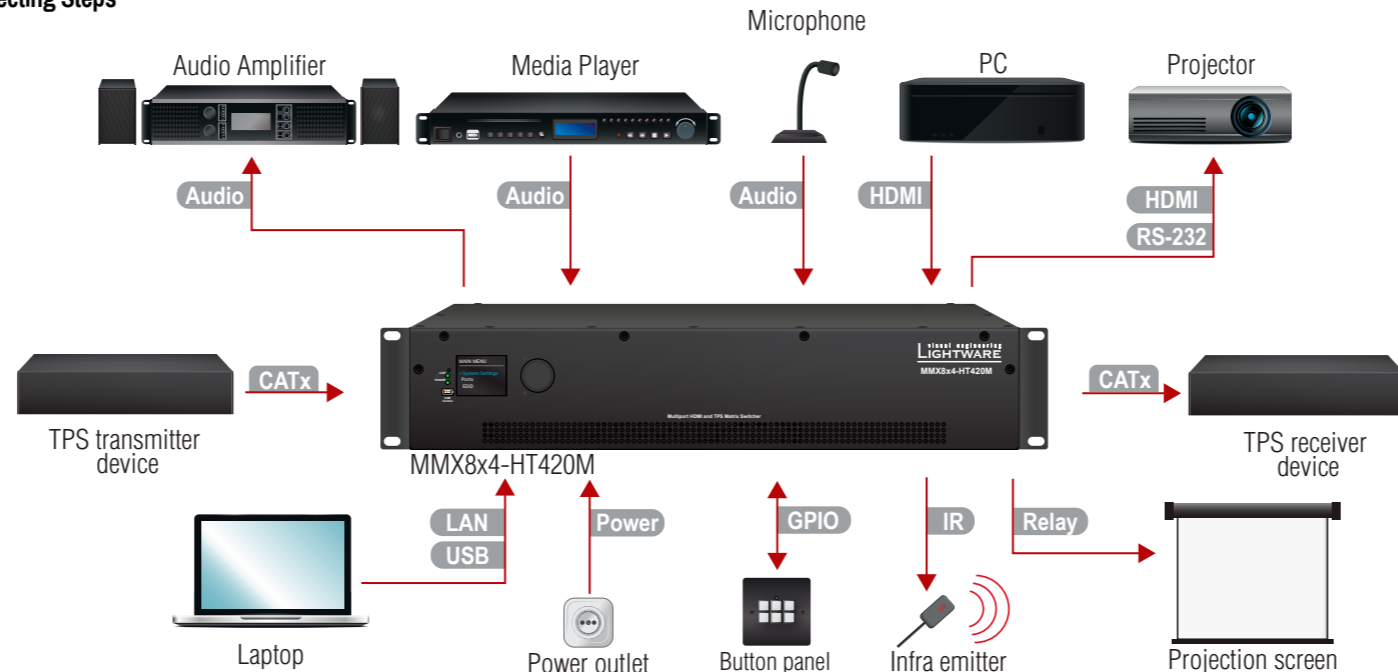|	Property	Value	Lightware Device Controller
Analog audio output (BAL.OUT)	Volume	0dB	0 dB
Microphone input (MIC IN)	Volume	0dB	0 dB

4. Talk to the microphone continuously. Increase the microphone input gain slowly and check the signal indicator chart. It gives a feedback about the optimal signal level.
   ⓘ *Take care that peak led (PK!) never lights up!*

MIC input gain	MIC signal
-12 ... +55	● PK! ● NOM. ● SIG.

5. If the signal level is low, set the optimal volume both the microphone input and balanced output channel. Always check the signal indicator chart for the optimal level!
   ⓘ *Take care that peak led (PK!) never lights up!*

MIC input volume	Output volume
0	0

Connecting Steps

Audio Amplifier — **Media Player** — **Microphone** — **PC** — **Projector**

Audio — Audio — Audio — HDMI — HDMI / RS-232

TPS transmitter device — **MMX8x4-HT420M** — TPS receiver device

CATx — CATx

LAN / USB — Power — GPIO — IR — Relay

Laptop — Power outlet — Button panel — Infra emitter — Projection screen

CATx Connect a HDBase-T™ -compatible transmitter or matrix output board to TPS input port. PoE-compliant.

HDMI Connect an HDMI source (e.g. PC) to the HDMI input port.

HDMI Connect an HDMI sink (e.g projector) to the HDMI output port.

Audio Optionally for analog output port: connect an audio device (e.g. audio amplifier) to the analog audio output port by an audio cable.

Audio See the **Installation Guide for Connecting a Microphone** section on the left, before connecting the microphone. Not proper setting can cause a damage.

Audio Optionally for audio input: connect the audio source (e.g. media player) to the audio input port by an audio cable.

USB Optionally connect the USB cable in order to control the matrix switcher via the Lightware Device Controller software.

LAN Optionally connect the UTP cable (straight or cross, both are supported) in order to control the matrix switcher via the Lightware Device Controller software.

Relay Optionally for relays: connect a controlled device(s) (e.g. a projection screen) to the relay port.

IR Optionally connect the infra emitter to the infra output port (2-pole Phoenix or 1/8" Stereo Jack connector) to transmit infra signal.

**GPIO** Optionally connect a controller/controlled device (e.g. button panel) to the GPIO port.

Power Connect the power cord to the AC power socket to the matrix unit.

ⓘ *Powering the device is recommended as the final step.*

Ethernet Link to TPS inputs and TPS outputs

TPS lines do not transmit Ethernet signal, but they can be transmitted on the TPS input and output ports, if there is a physical link between the motherboard and the input or the output board. This makes possible to control a third-party device or supply Ethernet via TPS. Connect a patch cable between

- **Ethernet Link to TPS inputs** and **TPS inputs Ethernet** labeled RJ45 connectors or
- **Ethernet Link to TPS outputs** and **TPS outputs Ethernet** labeled RJ45 connectors to create a link.

MMX8x4-HT420M — Ethernet link to inputs — Ethernet link to outputs
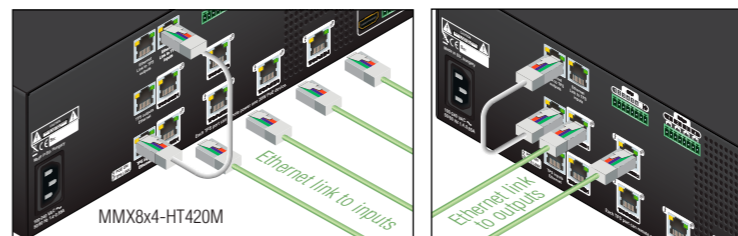
Maximum Extension Distances

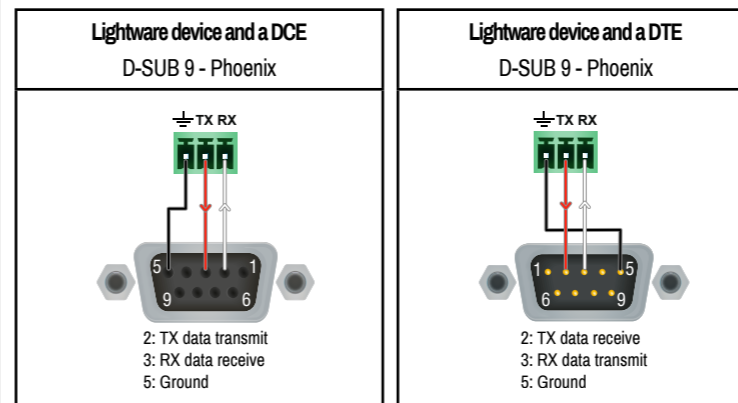| Resolution	Pixel clock rate	Cable lengths (Auto / Long reach TPS mode)		
		CAT5e AWG24	CAT7 AWG26	CAT7 AWG23
1024x768@60Hz	65 MHz	100 m / 130 m*	90 m / 120 m*	120 m / 170 m*
1280x720p@60Hz	73.8 MHz	100 m / 130 m*	90 m / 120 m*	120 m / 170 m*
1920x1080p@60Hz (24bpp)	148.5 MHz	100 m / 130 m*	90 m / 120 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.*

To specify the accurate extension distances, please also check the documentation of the connected TPS device.

ⓘ *CAT7 SFTP AWG23 cable is always recommended.*

Wiring Guide for RS-232 Data Transmission

MMX8x4 series matrix is 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
TX RX	TX RX
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.

Audio Cable Wiring Guide

MMX8x4 series matrix is built with 5-pole Phoenix input and output connectors. See below a few example of the most common assembling cases.

From balanced output to unbalanced input Phoenix - 3.5 (1/8") TRS	From unbalanced output to balanced input 3.5 (1/8") TRS - Phoenix
AUDIO Output	AUDIO Input

From balanced output to balanced input Phoenix - 2 x XLR	From balanced output to balanced input 2 x XLR - Phoenix
AUDIO Output	AUDIO Input

From balanced output to unbalanced input Phoenix - 2 x 6.3 (1/4") TS	From unbalanced output to balanced input 2 x 6.3 (1/4") TS - Phoenix
AUDIO Output	AUDIO Input

From balanced output to unbalanced input Phoenix - 2 x RCA	From unbalanced output to balanced input 2 x RCA - Phoenix
AUDIO Output	AUDIO Input

From balanced input to balanced output
1 x XLR - Phoenix

MIC Input
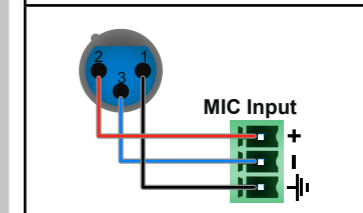
⚠ *Always check the correct wiring of the microphone cable! Never apply phantom power with unbalanced cable, because it can cause a damage!*

Microphone cable should be shielded with 2x0,22mm conductor, max. 50m long.

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

Serial Output Voltage Levels (TTL and RS-232)

	TTL*	RS-232
Logic low level	0 .. 0.25V	3 V .. 15 V
Logic high level	4.75 .. 5.0V	-15 V .. -3 V

*Using a receiver with at least 1k impedance to any voltage between 0V and 5V to get the voltages, but not compatible with the phased out TPS-90 extenders.