visual engineering
LIGHTWARE

Quick Start Guide

MX-FR9, MX-FR17, MX-FR33L
MX-FR33R, MX-FR65R, MX-FR80R

Introduction

The MX series matrix routers are the highest performance, modular expandable DVI and HDMI compliant switchers, available in five different frame sizes. The built-in sophisticated software and hardware features make these routers the most flexible integrated solution for AV professionals and high-end home theatre applications.

Hybrid Modular Matrix Concept

Lightware's hybrid modular matrix switchers allow building custom I/O sizes which meet the user's requirements. Different types of input and output boards give the maximum flexibility for rental and installation signal transmission. The hybrid architecture allows signal routing between boards even if they have different connectors. This way any input can be routed to any or more outputs if the output interface is capable of transmitting the signal.

IMPORTANT SAFETY INSTRUCTIONS

Please read and keep the information in the attached safety instructions supplied with the product before you start using the device.

CAUTION

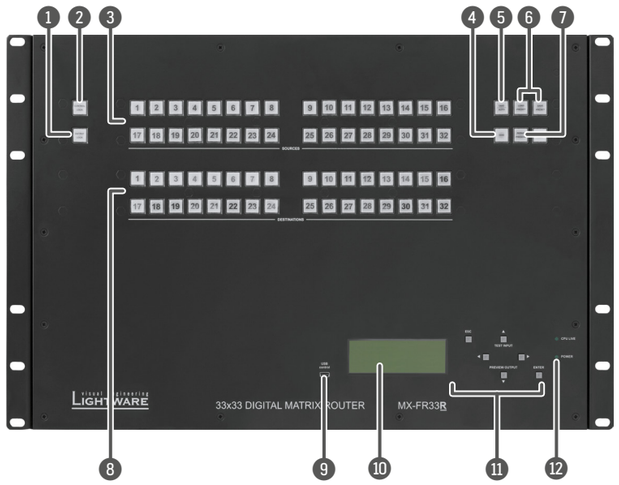
The MX-CPU2 board has a CR2032 button battery which supplies power to the clock when the matrix is not powered on. Danger of explosion if battery is incorrectly replaced. Replace only with the same of equivalent type.

WARNING

Do not ingest the battery, Chemical Burn Hazard. This product contains a coin/button cell battery. If the coin/button battery cell battery is swallowed, it can cause severe internal burns in just 2 hours and can lead to death. Keep new and used batteries away from children. If the battery compartment does not close securely, stop using the product and keep it away from children. If you think batteries might have been swallowed or placed inside any part of the body, seek immediate medical attention.

⚠ ***The device may contain boards which are Class 3R laser products. Caution! Invisible Class 3R laser radiation! Avoid exposure to the beam!***

Front View



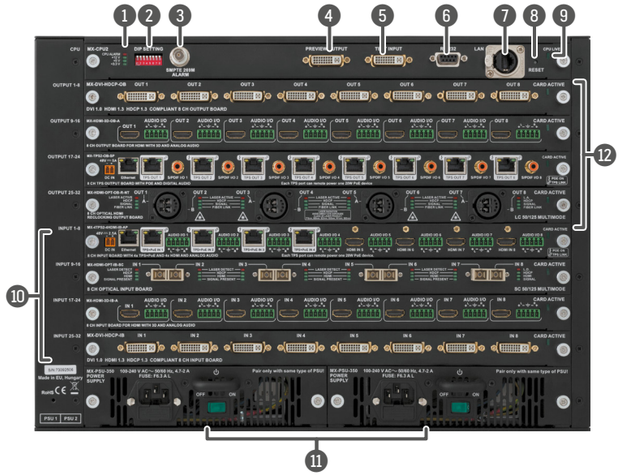
ℹ *The front panel of the matrix switchers look almost the same. The only difference is the number of source and destination buttons.*

Front View Legend

1	**Output Lock**	Locks and protects one or more outputs.
2	**Control Lock**	Disables or enables front panel operations. Red light means the switching and function buttons are disabled.
3	**Sources**	Buttons to select an input, to select a preset number or to view the state of the selected input port.
4	**EDID Mode**	The EDID Mode can be (de)activated by the button. The illuminated button shows that the mode is active.
5	**Take / Auto**	Switching between Take and Autotake working modes; keep the button pressed for 3 seconds to toggle the modes.
6	**Preset buttons**	Performing preset operations (Load and Save).
7	**Signal Present**	The Signal Present Mode can be (de)activated by the button. The illuminated button shows that the mode is active.
8	**Destinations**	Buttons to select an output or to see the state of an output.
9	**USB Control**	USB connection for Lightware Device Controller Software.
10	**Menu Display**	Displays status information and menu operation.
11	**Menu Navigation**	Up, down, left, right, enter, and escape buttons.
12	**Status LEDs**	Power LED indicates that the unit is powered on. CPU LIVE blinking LED indicates normal operation.

ℹ *Two rack ears are supplied with the product, which are fixed on the left and right side of the frame. These ears allow mounting the device as a standard rack unit installation.*

Rear View

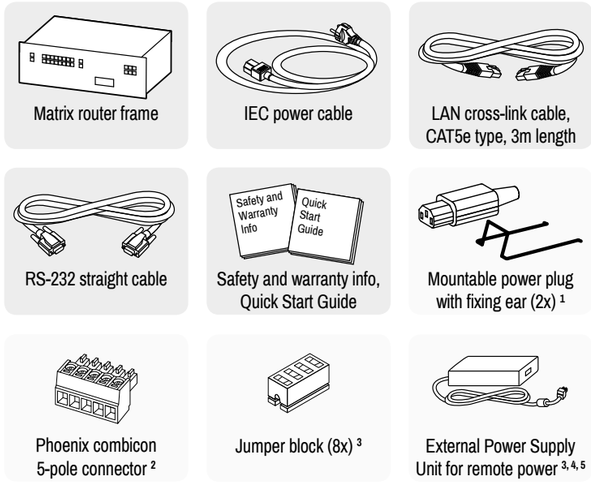


ℹ *MX-FR33L, MX-FR17, and MX-FR9 frames contain a power supply unit that is built into the matrix frame and not redundant.*

Rear View Legend

1	**Status LEDs**	LED indicators for internal DC power voltages, and alarm.
2	**DIP Settings**	Special settings can be made with these switches.
3	**Alarm Out**	Standard SMPTE 269M alarm output with BNC connector.
4	**Preview Out**	DVI output connector, which is directly connected to a certain output - see the table below.
5	**Test Input**	DVI input connector, which can be configured as an alternative for a certain input - see the attached table.
6	**RS-232 Port**	9 pole D-sub female connector for a standard RS-232 port.
7	**Ethernet Port**	Standard RJ45 connector. This port can be connected to a computer directly or to LAN via switch/router.
8	**Reset**	Reboots the matrix; the same as switching it off and on again.
9	**CPU Live**	CPU live LED blinks to indicate normal operation.
10	**Input Boards**	Modular input board slots.
11	**Power Supplies**	Hot swap slots for power supply units - available in MX-FR80R, MX-FR65R, and MX-FR33R matrix switchers.
12	**Output Boards**	Modular output board slots.

Box Contents



[1] supplied with MX-FR33R
[2] supplied with boards with 5-pole Analog audio port
[3] jumper blocks and PSU-12VP are supplied with TPS boards
[4] PSU-48VP2-120 is supplied with MX-4TPS2-4HDMI boards assembled with PoE add-on
[5] PSU-48VP2-220 is supplied with MX-TPS2 boards assembled with PoE add-on

The router frame includes:

- Router CPU board (MX-CPU2).
- Router input and output boards (depends on the ordered configuration).
- Power supply units (depends on the ordered configuration).
- Two rack mounting ears (fixed to the frame).

Ventilation

⚠ ***To ensure the correct ventilation and avoid overheating let enough free space around the appliance, do not cover it and let the ventilation holes free.***

The following picture shows the direction of the airflow:

Powering On

Connect the power cords to AC input of the Power Supply Units (PSU). After switching the mains switch to the 'I' position the router starts up. If the mains switch is not available or it was in the 'I' position, then the matrix starts up immediately when the power cord is connected to the AC source. During the initial self-test and loading of the latest settings, **Booting...** appears on the LCD screen and the router reloads its last configuration.

ℹ *After switching ON, the router reloads the latest settings that were used before it was switched off. The router has an internal emergency memory that stores all current settings and tie configurations.*

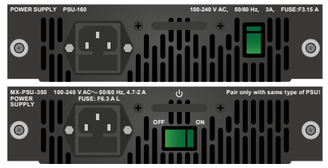
Redundant Power Supplies

FR80R, FR65R, and FR33R frames contain redundant PSUs which can be removed or installed during operation. Depending on the router's configuration (number and type of I/O boards) one or two PSUs are needed to operate. The extra PSU makes the system redundant. Please consult Lightware support about your system configuration to ensure redundancy. If more than one PSU is needed for supplying the matrix, make sure that the second PSU gets power not later than 10 seconds after the first one is plugged in to prevent overload on the first PSU.

New PSU for MX-FR33R

Two types of PSUs exist for FR33R frames. Both can supply the frame, but the two units are not interchangeable with each other.

⚠ ***Pay attention to install the same type of PSUs in a matrix!***



Board Replacement

⚠ ***Please pay attention to the protection against electrostatic discharge when touching a board! Do not touch the electrical components on the board as the electrostatic discharge may damage them!***

⚠ ***Please check the orientation of the slots! The input and output slots and boards have a different type of connectors.***

The steps of replacing an input or output board are the followings:

1. **Switch off the matrix.**
2. Disconnect all the cables from the rear side of the affected board.
3. Loose the fixing screws on the rear side of the board (see the blue arrows on the figure).
4. Pull out the board and put it in an ESD-safe bag.
5. Place the new board into the desired empty slot. Be careful when you insert the board into the socket connector.
6. Tighten the screws to fix the board to the frame.
7. Connect the necessary cables to the boards and switch on the matrix.
8. Connect to the matrix using Lightware Device Controller to set the necessary port parameters.

ℹ *To fill all slots or place a blank plate on a not-used slot is highly recommended (MX-BLANK-IO, part no: 52400115).*

Further Information

The document is valid with the following firmware version: 3.5.0
The User's manual of this appliance is available on www.lightware.eu.
See the Downloads section on the website of the product.

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CONTROL LOCK

If the button illuminates in **red** the switching- and function buttons are disabled. Press the **Control lock** button to toggle the state.

ℹ *When the front panel buttons are locked, remote control (RS-232, USB, Ethernet) is still available.*

LDC Menu - Navigation

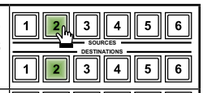
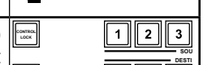
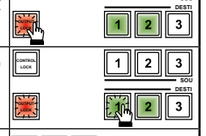
The front panel LCD has 4 lines and 20 characters in each line. The up and down buttons can be used to scroll between the menu items. The enter button steps in a submenu or saves changes. The escape button steps back to the previous menu. The left and right navigation buttons modify the value of the current menu item. The right button steps in the current submenu and the left button steps back to the previous menu.

Menu items can be submenus, values, or checkboxes. The '~' sign shows the currently selected menu item. Submenus are marked with '>>' sign. Changeable values appear between '<' and '>' signs. Checkboxes are shown like '[*]', where the asterisk indicates if the function is active or not.

```
·IP settings        >>
 RS-232 settings
 Protocol settings
 Input settings
```

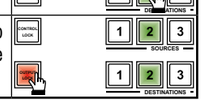
Front Panel Controls in TAKE Mode

Take mode allows the user to connect or disconnect multiple outputs to an input at once. This mode is useful when the time delay is not allowed between multiple switching. The commands are only realized when the **Take** button is pressed.

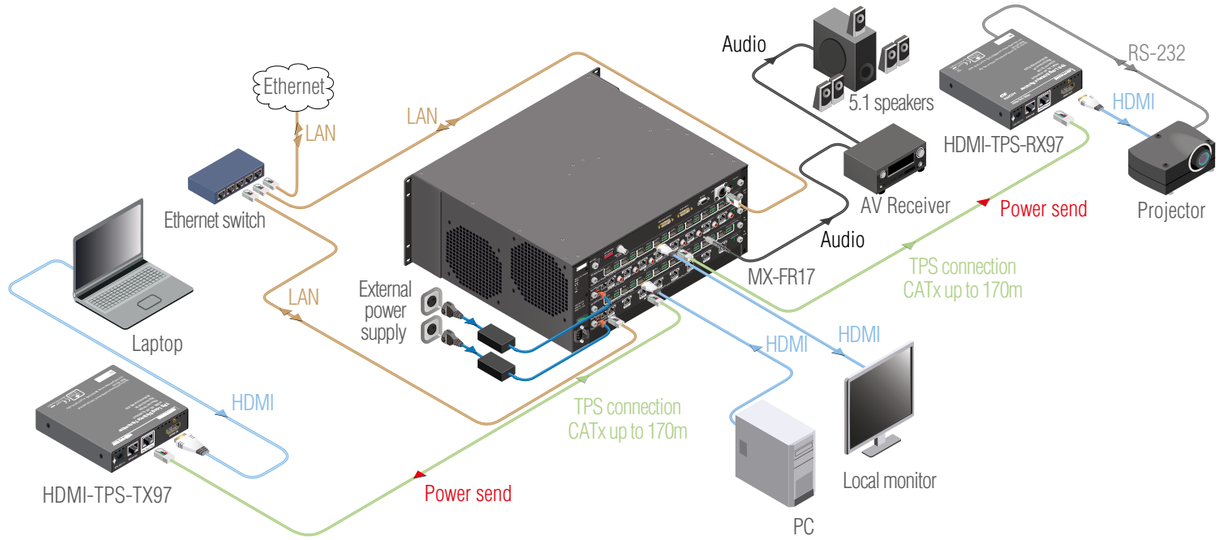
Switching operations	1. First, press and release the desired **source button**. The pressed source button and all destination buttons which are currently connected to the source lights up.	
	2. Press and release the desired **destination buttons** which have to be (dis)connected to/from the selected source. The preselected destination buttons will blink.	
	3. Press and release **Take** button; the selected input is switched to the selected output(s).	
Lock an output	1. Press and release the **Output Lock** button; it starts to blink and all the buttons of any locked destinations light up (view state).	
	2. Press and release a **destination button**; it starts to blink (more destinations can be selected sequentially).	
	3. Press and release **Take** button. The selected destinations are now locked.	

Front Panel Controls in AUTOTAKE Mode

Autotake mode is useful when immediate actions must be done or fast switching is needed between sources on a particular destination. In this mode switching occurs immediately upon pressing one of the input selector buttons.

Switching operations	1. Press and release the desired **destination button**. The pressed destination button and the actually connected source button light up green. If no source is connected (the output is muted) no source button will light up.	
	2. Press and release the desired **source button**. The switch action will be executed immediately. Switching between sources to the selected destination can be done directly.	
Lock an output	1. Press and release the required **destination button**. Now the selected destination button and the currently configured source button light up (view mode).	
	2. Press and release the **Output Lock** button; it lights up in red, and lock function is activated at once. No source can be changed at the locked destination.	

Typical Application - an MX-FR17 with HDMI-TPS-TX97/RX97 Extenders



Network Settings on the Front Panel

Setting a Dynamic IP Address

1. Navigate to the **IP settings** menu item and press the **Enter** button.
2. Use the **Up** and **Down** buttons to navigate to the **DHCP enable** sub-item.
3. Press the **Enter** to toggle between enable and disable status. If the DHCP is switched off then the IP address can be set by the user.
4. To take effect, navigate to **Save settings**, then press the **Enter**.
5. Any changes made in the IP settings menu come alive only when **Save settings** is executed. To do this, navigate to this item with the **Up** and **Down** buttons, and press the **Enter**.

```
IP SETTINGS
 IP status
·DHCP enable   [*] ·
 Port
```

Setting a Static IP Address

1. **Disable DHCP** as described above.
2. The four parts of the IP address can be set separately. Use the **Left** and **Right** buttons to select the part, then use the **Up** and **Down** buttons to change the value of that part.
3. Any change made in the IP settings menu comes alive only when **Save settings** is executed; navigate to this item with the **Up** and **Down** buttons and then press the **Enter**.

```
IP SETTINGS
·IP address        >>
 Default gateway
 Subnet mask
```

ℹ *New IP settings can be applied while an active connection is alive on the Ethernet port but in this case, the active connection will be closed automatically. To reconnect the Ethernet port needs to be used again.*

Factory Default Settings

The settings and parameters can be set to factory default as follows:

1. Navigate to **Factory reset** menu.
2. Press the **enter** button to select the desired component (IP reset, IO card reset, EDID reset, HDCP key reset, Protocol reset, All reset).

IP address (static)	192.168.254.254
Subnet mask	255.255.0.0
Static gateway	0.0.0.0
DHCP	disabled
TCP/IP port no.	10001
RS-232 port setting	57600 BAUD, 8, N, 1
Emulated EDID	static F49 at all inputs
Crosspoint settings	all outputs connected to input 1
CPU test input - color range	no change
CPU test input - HDCP enable	yes
CPU preview output - video mode	auto
CPU preview output - colorspace	auto
CPU preview output - color range	auto
CPU preview output - LPCM subsample	auto
CPU preview output - HDCP	auto
Input/Output board setting	depends on the installed board

MX-CPU2 Processor Board

There is a CPU board in the router which is necessary for the frame to work. That board is responsible for controlling the matrix and storing the settings.

Test Input and Preview Output Ports

The MX-CPU2 board has a **TEST** DVI input, and a **PREVIEW** DVI output port. Although these ports have special functions they can be used as normal I/O ports including HDMI- and HDCP capability.

Frame type	Test input	Preview output
MX-FR9	in 9	out 9
MX-FR17	in 17	out 17
MX-FR33R	in 33	out 33
MX-FR65R	in 80	out 80
MX-FR80R	multiplexed in 80	distributed out 80

MX-FR80R and MX-FR65R

Used in the MX-FR80R (and MX-FR65R) router frame, the Preview output is directly connected to the 80th output port with a DVI splitter. Therefore, that port always outputs the same signal as the 80th output, even if it uses a different interface (TP, OPT, etc.).

The 80th input port of the crosspoint is multiplexed between the Test input port and the 8th port of the 10th input board. This switch is independent of the crosspoint state. The selected port (Test input or Input board #10) will be available as the 80th input on the crosspoint switch.

Other Frames

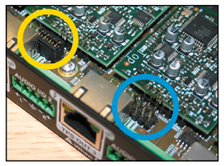
All other frames use the Test input and Preview output just like any other ports. These ports are referred as the last port in the crosspoint.

The Remote Power Feature of MX-TPS Boards

⚠ ***Incorrect configuration can DAMAGE the devices! In this case the devices cannot be repaired under warranty.***

MX-TPS boards can be configured to remotely power the connected TPS-TX/RX95 extenders. To use remote powering you will need the followings:

- PSU-12VP (part no: 91340007) external PSU,
- Jumper pack (part no: 91340008).



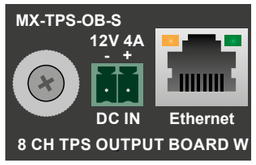
Cable length

Please note, that the distances are 20% shorter if the remote powering is used in the case of AWG 26 CAT cables. The remote powering can be enabled or disabled for each port separately. Some of the ports can have remote powering enabled for Lightware extenders. While other ports can have remote powering disabled and be used with HDBaseT™ compliant devices.

Important instructions

- Never connect any third party devices. When remote power is active the ports are NOT HDBaseT™ compliant.
- Below jumper setting is compatible only with Lightware TPS-TX/RX95 devices.
- The discontinued TPS-TX/RX90 extenders cannot be powered with the TPS boards.

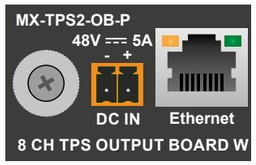
Configuration Steps



1. Power off the matrix and take the desired board out to access the pin headers.
2. Locate the pin headers on the board. They are next to the RJ45 receptacles (TPS ports).
3. Place the jumper block on the desired pin header(s); see the yellow circle.
4. Place the matrix board into the frame and tighten the screws. Connect the CATx cables.
5. Connect the PSU-12VP power supply to the DC IN connector on the left side of the board. The connected extenders – where the Jumper block is set to enabled position on the board as well as in the extender – will power up instantly.
6. Power up the matrix and check the TPS links and signal transmission.

The Remote Power Feature of MX-TPS2 Boards (PoE-compatible)

Remote powering option for a connected PoE-compatible TPS extender is available in the case of MX-TPS2 boards. To use the function you will need the supplied external PSU.



⚠ ***TPS-TX/RX90 and TPS-TX/RX95 devices do not comply with the PoE standard and cannot be powered this way.***

Remote Operation

The matrix can be controlled through various interfaces remotely. The feature allows using functions which are not accessible via the front panel. Also, it helps system integrators and operators to control multiple devices in a complicated system by a single user interface.

Control Interfaces

The User can connect to the matrix through the Ethernet, serial, or USB port. After establishing the connection, there is no difference between the connection types generally.

ℹ *Ethernet port can be connected to a LAN hub, switch or router with a UTP patch cable. If connecting to a computer directly, a crosslink UTP cable has to be used!*

User Interface	Ethernet Port	RS-232 Port	USB Port
Lightware Device Controller	✔	✔	✔
Built-in Website	✔	-	-
Third-party Control System	✔	✔	-

Multiple Simultaneous Connections

Ethernet and Serial connections can be used at the same time. However, only one connection is allowed for Lightware Device Controller (LDC) via the Ethernet port.

Control Protocols

Matrix routers can be controlled with multiple control protocols. Lightware routers have a special protocol but to interoperate with third-party devices, a secondary protocol is also provided. For detailed information about control protocol, read the User's manual of the device.

Port Settings

The port settings of each type of boards are stored at dedicated memory places on the MX-CPU2 board. If an input/output board is replaced to another one, the stored settings will be applied to the new board according to below table:

	Mute-, lock-, and crosspoint states	Port-specific parameters and settings
Same type of board* has been installed into the same slot previously	Restored from last used board	Restored from prevoius same type of board*
No such type of board has been installed into the given slot previously	Restored from last used board	Factory default settings and parameters are loaded

* Same type of board: it does not matter if any add-on (like Audio or PoE extension) is installed on the board. E.g. MX-HDMI-3D-OB-A and MX-HDMI-3D-OB boards are handled as 'same types'.