

# MIMO88

DIGITAL MATRIXES

*Installation Digital Matrix*



## USER MANUAL

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## 1. IMPORTANT REMARK



WARNING: SHOCK HAZARD - DO NOT OPEN


AVIS: RISQUE DE CHOC ÉLECTRIQUE - NE PAS OUVRIR



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

**WARNING (If applicable):** The terminals marked with symbol of “” may be of sufficient magnitude to constitute a risk of electric shock. The external wiring connected to the terminals requires installation by an instructed person or the use of ready-made leads or cords.

**WARNING:** To prevent fire or shock hazard, do not expose this equipment to rain or moisture.

**WARNING:** An apparatus with Class I construction shall be connected to a mains socket-outlet with a protective earthing connection.

## 2. IMPORTANT SAFETY INSTRUCTIONS

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

9. Do not defeat the safety purpose of the polarized or grounding type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at the plugs, convenience receptacles, and at the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Unplug the apparatus during lightening sorts or when unused for long periods of time.
13. Refer all servicing to qualified personnel. Servicing is required when the apparatus has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
14. Disconnecting from mains: When switching off the POWER switch, all the functions and light indicators of the unit will be stopped, but fully disconnecting the device from mains is done by unplugging the power cable from the mains input socket. For this reason, it always shall remain easily accessible.
15. Equipment is connected to a socket-outlet with earthing connection by means of a power cord.
16. The marking information is located at the bottom of the unit.
17. The apparatus shall not be exposed to dripping or splashing and that no objects filled with liquids, such as vases, shall be placed on apparatus.

**NOTE:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



**WARNING:** This product must not be discarded, under any circumstance, as unsorted urban waste. Take to the nearest electrical and electronic waste treatment centre.

NEEC AUDIO BARCELONA, S.L. accepts no liability for any damage that may be caused to people, animal or objects due to failure to comply with the warnings above.

### 3. IMPORTANT NOTE

Thank you for choosing our Ecler **MIMO88 Installation Digital Matrix!**

It is **VERY IMPORTANT** to carefully read this manual and to fully understand its contents before any connection in order to maximize your use and get the best performance from this equipment.

To ensure optimal operation of this device, we strongly recommend that its maintenance be carried out by our authorised Technical Services.

Ecler **MIMO88** comes with a **3-year warranty**.

### 4. INTRODUCTION

The MIMO88 is a fully programmable digital audio matrix, with the following features:

- 8 balanced MIC/LINE inputs (independent phantom power per input channel).
- 8 balanced LINE outputs.
- 2 MONITOR outputs that can be used as auxiliaries.
- Expandable to 16 inputs/16 outputs by linking a second MIMO88 unit (getting a real 16 inputs and 16 outputs matrix). Connect the two units using a CAT5 crossover cable (100 meters maximum distance).
- 8 GPI control ports (*General Purpose Input*).
- 8 GPO control ports (*General Purpose Output*).
- Programming and remote management via Ethernet using EclerNet Manager (or point to point, with a direct CAT5 cable, or from an Ethernet network).
- Remote control via Ethernet clients of EclerNet Manager: simultaneous clients with custom control panel.
- Remote control from third party external devices. (Crestron, AMX, Vity, Medialon, etc. Registered trademarks of their manufacturers). TP-NET protocol, via Ethernet or RS-232 ports.
- Remote control bus for WPTOUCH digital panels and MPAGE16 messaging consoles (*paging*).
- Configuration memory (*presets*) management.
- Scheduled events based on calendar.
- Extensive DSP available:
  - Routing matrix/mixer, from any input to any output with adjustable level for crossover points (independent mixes of different inputs for each output).
  - Mono or stereo channel processing.

- Level control, mute, vu-meters and phase adjustment for inputs and outputs.
- Internal signal generator (sine wave, pink noise, white noise, polarity test).
- Parametric EQ on inputs and outputs.
- Delay on inputs and outputs.
- Gate/compressor on input channels.
- Compressor/limiter on outputs.
- Input channel priority assignment (ducking).
- Virtual and physical messaging consoles (paging).
- Automatic mixer.

The MIMO88 programming is done with [EclerNet Manager](#). Please refer to the EclerNet Manager software manual for more information.

## 5. INSTALLATION

### 5.1. Location, assembly, ventilation

The MIMO88 has been especially designed to be installed in a standard 19" rack, taking up 1U.

It is very important not to enclose the MIMO88 or expose it to extreme temperatures as it generates heat. It's also necessary to promote the passage of fresh air through the ventilation holes of the chassis, leaving at least one rack unit off between each device and installed above and below it in the rack frame.

If the setup has several amplifiers in the same rack or in a closed cabinet with doors, it is highly recommended to supply them forced ventilation, installing fans at the upper and lower ends. This upward air flow will help to dissipate the heat generated inside.

### 5.2. Connection to an AC outlet and switching on

The MIMO88 operates under voltages between 90 and 264 V at 47 to 63 Hz. This device features an over dimensioned power supply that adapts to the mains voltage in any country of the world with no need to make any adjustments.

On the rear panel, there is a power switch for the unit (20) next to the IEC power connector. On the front panel, a LED (7) lights up when the unit is switched on.

The mains cables must not be near the shielded cables carrying the audio signal, as this could cause humming.

### 5.3. Signal input connections

The rear panel of the MIMO88 offers 8 balanced analogue signal inputs, "IN" (9), accepting both line and microphone level signals. Input signal type selection and management are carried out from EclerNet Manager application. Please refer to the EclerNet Manager software manual for more information.

Signal input connectors are 3 position screw terminal block. The wiring is:

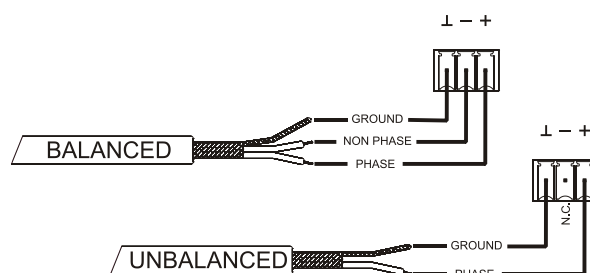
Hot or direct signal	>	Terminal +
Cold or inverted signal	>	Terminal -
Ground	>	Terminal $\perp$

For unbalanced connection short-circuit pin  $\perp$  to pin -.

### 5.4. Audio Output Connections

The rear panel of the MIMO88 offers 8 analogue signal outputs, "OUT" (8), and two additional "MONITOR" (10) outputs, all balanced and accepting line level signals.

Signal output connectors are 3 position screw terminal blocks. The wiring is:



Hot or direct signal	>	Terminal +
Cold or inverted signal	>	Terminal -
Ground	>	Terminal $\perp$

For UNBALANCED connections, leave the - terminal unconnected.

## 5.5. ETHERNET port for programming and control

A RJ45 type connector (11) allows connecting the equipment to an Ethernet network:

- Management from EclerNet Manager application. Please refer to the EclerNet Manager software manual for more information.
- Possibility of direct connection (point to point) between a computer and a MIMO88 unit.
- Connection to third party other devices. (Crestron, AMX, Vity, Medialon, etc. Registered trademarks of their manufacturers). Protocol used: Ecler TP-NET. See the TP-NET protocol manual for more information.

## 5.6. LINK BUS digital audio port

A RJ45 type connector (12) allows connecting the equipment to a second MIMO88 unit for a two-way exchange of digital audio and control data between the two units, the whole behaving as a real matrix with 16 inputs and 16 outputs. The maximum permissible distance between the two units using a standard CAT5 cable is 100 meters.

To work in 16x16 mode, one of the two coupled MIMO88 units (linked by BUS LINK) assumes the role of MASTER and the other one the role of SLAVE. MASTER or SLAVE mode is set by the selector (13) located on the rear panel of each unit. In single MIMO88 setups, selector position is irrelevant.

In 16x16 mode, the two units behave as a single device with 16 inputs and 16 outputs. All Ethernet programming and remote control of the MASTER-SLAVE pair is done with EclerNet Manager application and communication uses the Ethernet port of the MASTER unit only, it's not necessary to use the Ethernet port of the SLAVE unit. (Except for updating the firmware).

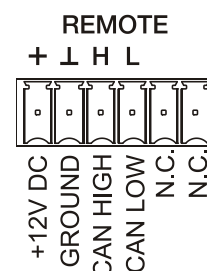
**Caution:** two MIMO88 units coupled by BUS LINK **should be linked with a crossover cable**, i.e. with a CAT5 cable dedicated to the BUS LINK ports of both units, up to 100 meters long, and **without intermediate Ethernet hardware or other**. Please refer to the EclerNet Manager software manual for more information.



RJ-45 CONNECTOR WIRING "CROSSOVER"			
RJ-45 (1)	COLOR	RJ-45 (2)	
PIN 1	WHITE/ORANGE	PIN 3	
PIN 2	ORANGE	PIN 6	
PIN 3	WHITE/GREEN	PIN 1	
PIN 4	BLUE	PIN 7	
PIN 5	WHITE/BLUE	PIN 8	
PIN 6	GREEN	PIN 2	
PIN 7	WHITE/BROWN	PIN 4	
PIN 8	BROWN	PIN 5	

### 5.7. REMOTE ports 1 and 2 for digital remote controls

The REMOTE 1 and REMOTE 2 ports (14) are two connection points for the digital bus of remote control devices such as WPTOUCH wall panel or MPAGE16 messaging console (paging). Each of them can be connected to a digital bus branch, at which the various remote devices will be daisy-chained, the last one being loaded with a 120  $\Omega$  termination resistance between CAN HIGH and CAN LOW.



Refer to the remote device documentation (WPTOUCH, MPAGE16, etc) for more information about your connection and controls.

Refer to the EclerNet Manager application manual for more information about MIMO88 programming to manage remote devices connected to REMOTE1 or REMOTE2.

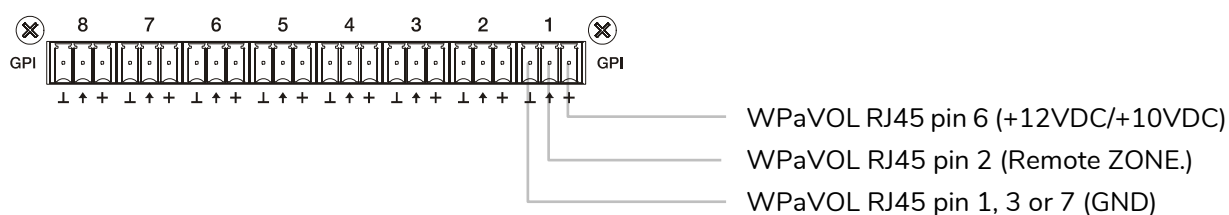
## 5.8. GPI Remote Control Ports

The rear panel of the MIMO88 offers 8 GPI inputs (16) for 0-10 VDC continuous control voltage. Each of these inputs can be connected to an external physical device (potentiometer, contact closure, continuously variable voltage 0-10V DC, etc.) and assigned to a MIMO88 function, as for example:

- Input, output channel or matrix crosspoint volume remote control by means of a WPVOL physical knob or an Ecler WP Series WPVOL-IR remote control
- MUTE or SOLO activation/deactivation by means of a switch or contact closure
- Recalling a preset with a push button or contact closure

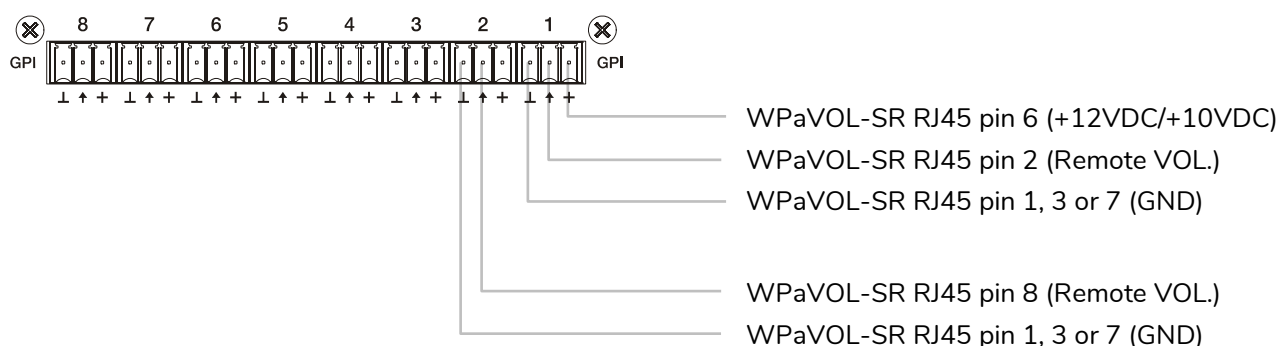
GPI connectors are screw terminal blocks with three-contacts. The wiring is as follows:

Positive, + 12 VDC	>	Pin +
Variable voltage, 0-12 VDC	>	Pin ↑
Ground	>	Pin ⊥



Jumpers position: ALOG / LIN → **LIN position**  
+12 / +10 → **+12 position**

### WPaVOL connection to MIMO serial GPI ports



Jumpers position: ALOG / LIN → **LIN position**  
+12 / +10 → **+12 position**

### WPaVOL-SR connection to MIMO serial GPI ports

Connecting cables can be up to 500 meters with a minimum section of 0.5 mm<sup>2</sup>.

Consult your ECLER dealer or [www.ecler.com](http://www.ecler.com) about the WP series remote control wall panels and other accessories available for connection to the REMOTE/VCA port.

### 5.9. GPO Remote Control Ports

The rear panel of the MIMO88 offers 8 NO/NC (normally open/ normally closed) relay outputs (17). Each of these outputs may be assigned to a MIMO88 function, such as a button of EclerNet Manager (MUTE key, SOLO key, etc.). This makes it possible to interact with external devices such as projection screen motors or movable partitions, lights, sirens, other equipment GPI entries, etc.

### 5.10. Remote control RS-232 Port

The built-in RS-232 port in the rear panel allows an external device to communicate with an MIMO88 unit via a serial connection. Said connection uses the TP-NET protocol syntax so to enable the external device to obtain the value of any of the parameters of the MIMO88 unit (by "GET" commands) and/or modify said values ("SET" commands). See the TP-NET protocol manual for more information.

The serial connection should comply with the following specifications:

Baud rate: 57600 (fixed, no auto negotiation)

Data bits: 8

Parity: None

Stop bits: 1

Flow control: None

WIRING RS232 – DB9	
RS232	DB9
Tx	Pin 2 (RxD)
Rx	Pin 3 (TxD)
Gnd	Pin 5 (Signal Gnd)

### 5.11. Front panel controls and LED indicators

The following elements are available on the MIMO88 front panel:

- **MONITOR output** (marked with a headphones symbol): it produces the same monitoring signal already available via the rear panel screw terminal block, but here on a ¼" TRS jack and with a rotary volume control (2 ) for listening through headphones. It is especially useful for listening to input or output signals without disturbing the normal operation. In 16x16 mode both MIMO units receive the same signal. The monitored signal is selected with EclerNet Manager control software. Please refer to the EclerNet Manager software manual for more information.
- **Input LED indicators:** indicate the presence of audio signal at the unit's input, and its intensity level (green, amber and red indicate in this order the increased intensity level)
- **Output LED indicators:** indicate the presence of audio signal at the unit's output, and its intensity level (green, amber and red indicate in this order the increased intensity level)
- **Status LED indicators (STATUS):**
  - **DATA:**
    - Off: there is no connection to EclerNet Manager even if connected to Ethernet.
    - On: connected to EclerNet Manager or to other third party application via TP-NET protocol. Flashing: data traffic with EclerNet Manager or another application.
  - **LINK:**
    - 1. If the device is configured as 8x8 MASTER, the LED is permanently off.
    - 2. If the device is configured as 16x16 MASTER:
      - If everything is correct (SLAVE is connected and there is no communication error), the LED quickly and continuously toggles between green (50ms) and unlit (50ms)
      - If there is a communication error with the SLAVE, the LED quickly toggles between green (50ms) and red (200ms)
      - If no SLAVE is connected (or if connected equipment is another MASTER), the LED slowly toggles between green (800ms) and red (200ms)
    - 3. If the device is configured as SLAVE:
      - If everything is correct (MASTER is connected and there is no communication error), the LED quickly and continuously toggles between orange (50ms) and unlit (50ms)
      - If there is a communication error with the MASTER, the LED quickly toggles between orange (50ms) and red (200ms)

- If no MASTER is connected (or if connected equipment is another SLAVE), the LED slowly toggles between orange (800ms) and red (200ms)
- **POWER:** illuminates when the unit is in operation. It flashes if there is an error in the unit or if firmware is not correct. It also flashes when you update firmware

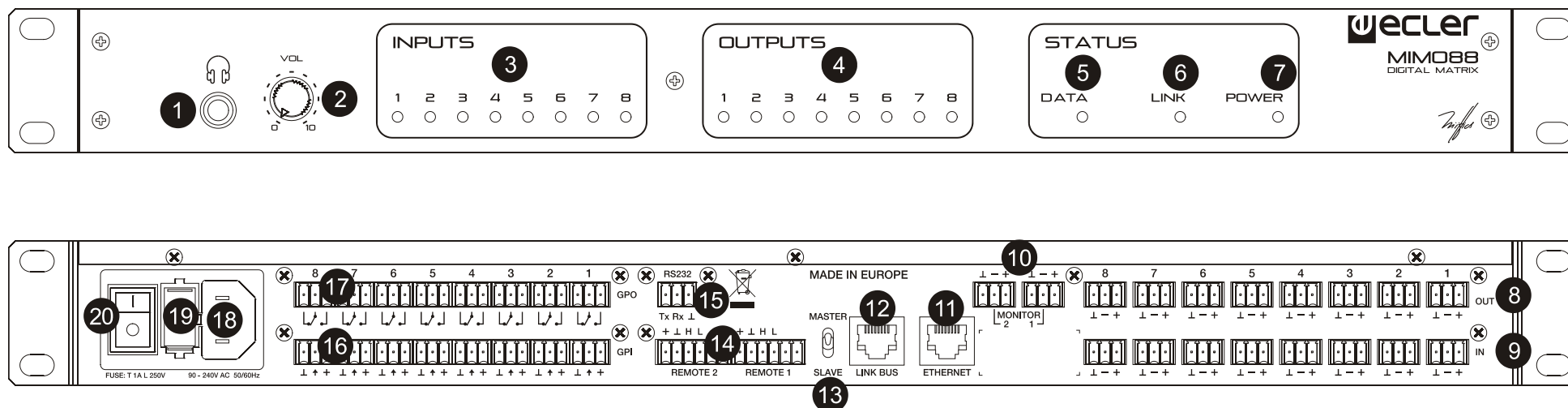
## 6. CLEANING

The front panel should not be cleaned with dissolvent or abrasive substances because silk-printing could be damaged. To clean it, use a soft cloth slightly wet with water and neutral liquid soap; dry it with a clean cloth. Be careful that water never gets into the unit through the holes of the front panel.

## 7. FUNCTION LIST

1. Headphones connection stereo jack
2. Volume control for the headphones output, VOL
3. Input signal indicators, INPUTS
4. Output signal indicators, OUTPUTS
5. Data traffic indicator, DATA
6. Link (with another unit) indicator, LINK
7. Power on indicator, POWER
8. Signal output screw terminal, OUT
9. Signal input screw terminal, IN
10. Signal output screw terminal, MONITOR
11. RJ-45 connector, ETHERNET
12. RJ-45 connector, LINK BUS
13. MASTER – SLAVE selector, MASTER SLAVE
14. Screw terminals for digital remote control, REMOTE
15. Screw-assembled remote-control terminals via the TP-NET, RS-232 protocol
16. Screw terminals for continuous voltage control, GPI
17. Screw terminal for relay output, GPO
18. Mains socket
19. Fuse holder
20. Power switch

## 8. FUNCTION DIAGRAM



## 9. TECHNICAL CHARACTERISTICS

### DSP

DSP	2x 32/64bit
Sampling Rate	48kHz
Latency IN to OUT	<2.9ms (+1ms for 16x16)

### Converters

Resolution	24bit AKM
Dynamic Range	AD:110dB, DA: 115dB

### Analog

8 Input/Output (expandable to 16x16)	Terminal block (Symmetrical)
2 monitor output	Terminal block (Symmetrical)
Headphones related	Jack ¼
Analog Input headroom	+27dBV = +30dBu
Max. output level	+18dBV = +21dBu
Input sensitivity @ 0dBV out	From -50dBV to +10dBV in 0.5dB step
Input Impedance	Balanced, >4kΩ
Phantom power	+42VDC, 5mA max. software switched
Headphones	>200mW/200Ω
Frequency response (-3dB)	5Hz to 24kHz
Flatness	better than ±0.1dB
THD+Noise @ 1kHz, 0dBV input (line)	<0.004%

THD+Noise @ 1kHz, -40dBV input (mic.)	<0.008%
Output Noise floor FFT (20Hz - 20kHz)	better than 115dB
Interchannel crosstalk (20Hz - 20kHz)	better than 90dB (100dB typ.)
Channel Leakage (20Hz - 20kHz)	better than 100dB (115dB typ.)
CMRR 20Hz- 20kHz	65dB typ.

## Processing

Input Level (x8)	Range: from Off to 0 dB  Mute: Yes  Signal Polarity reverse: Yes  Metering: VU+clip pre & post fader
Output Level (x8)	Range: from Off to 0 dB  Mute: Yes  Solo: Yes  Signal Polarity reverse: Yes  Metering: VU+clip pre & post fader
Output Gain (x8)	Range: from 0 to +6 dB
Input Delay (x8)	from 0 to 1000 ms  Units: sec/ms/m/cm.
Output Delay (x8)	from 0 to 1000 ms  Units: sec/ms/m/cm.



## Parametric Eq. Types

(4 max per input)

(8 max per output)

Bypass / On-Off all channels

Param Eq.      Freq: 20Hz-20kHz;

Gain: -60/+12 dB

Q: 0.3 to 200

Low & High Shelf 6/12 dB/oct

Low & High Pass 6/12 dB/oct

All Pass 1/2 order

## High & Low pass output Crossover filters (x8)

Bypass On-Off

Butterworth in 6/12/18/24 dB/oct

Bessel in 12/18/24 dB/oct

Linkwitz-Riley in 12/24 dB/oct

## Input Noise Gate (x8)

Bypass On-Off

Threshold: from -80 dBV to +18 dBV

Depth: 0 dB to 80 dB

Knee: hard / soft

Attack time: from 0,1 ms. to 500 ms.

Hold time: from 10 ms. to 3000 ms.

Release time: from 10 ms. to 1000 ms.

## Input Compressor / Limiter (x8)

Bypass On-Off

Threshold: from -36 dBV to +18 dBV

Ratio: 1:1 to inf:1 (limiter)

Knee: hard / soft

Attack time: from 0,1 ms. to 500 ms.

Release time: from 10 ms. to 1000 ms.

Make up gain: from 0 to +10 dB

## Input Frequency Shifter (x8)

Per input. ON / OFF function

## (Feedback Loop Reducer)

## Output Limiter (x8)

Bypass On-Off

Threshold: from -36 dBV to +18 dBV

Ratio: inf:1 (limiter)

Attack time: from 0,1 ms. to 500 ms.

Release time: from 10 ms. to 1000 ms.

## Built in Signal Generator

Sine: from 20 Hz to 20 kHz

Polarity: from 20 Hz to 20 kHz

White noise

Pink noise

## Stereo Linking

Adjacent input / output channels

Linked processing

Matrix routing linked

**Mix Matrix**

Size: 8x8 (1-MIMO88)

Size: 16x16 (2-MIMO88 with expan. link bus)

Vol: Input, Output, Crosspoint

Mute: Set/Clear individual, row, column, all

Input /output Mono/stereo selector

Meter: Input /output VU and clip

**Pager (x4)**

Input: IN1 to IN8 (or to IN16 in 16x16)

Priorities: 4 (1 max, 4 min)

Depth: 0 dB to 80 dB

Attack time: from 0,1 ms. to 500 ms.

Release time: from 10 ms. to 1000 ms.

Chime Source: None, Melody 1, Melody 2

Chime Volume: from -12 dB to 0 dB

**Mechanical**

Dimensions

482.6x44x266.5mm

Weight

3.5kg

**Supply**

Mains

90-264VCA 47-63Hz

Power consumption

75VA

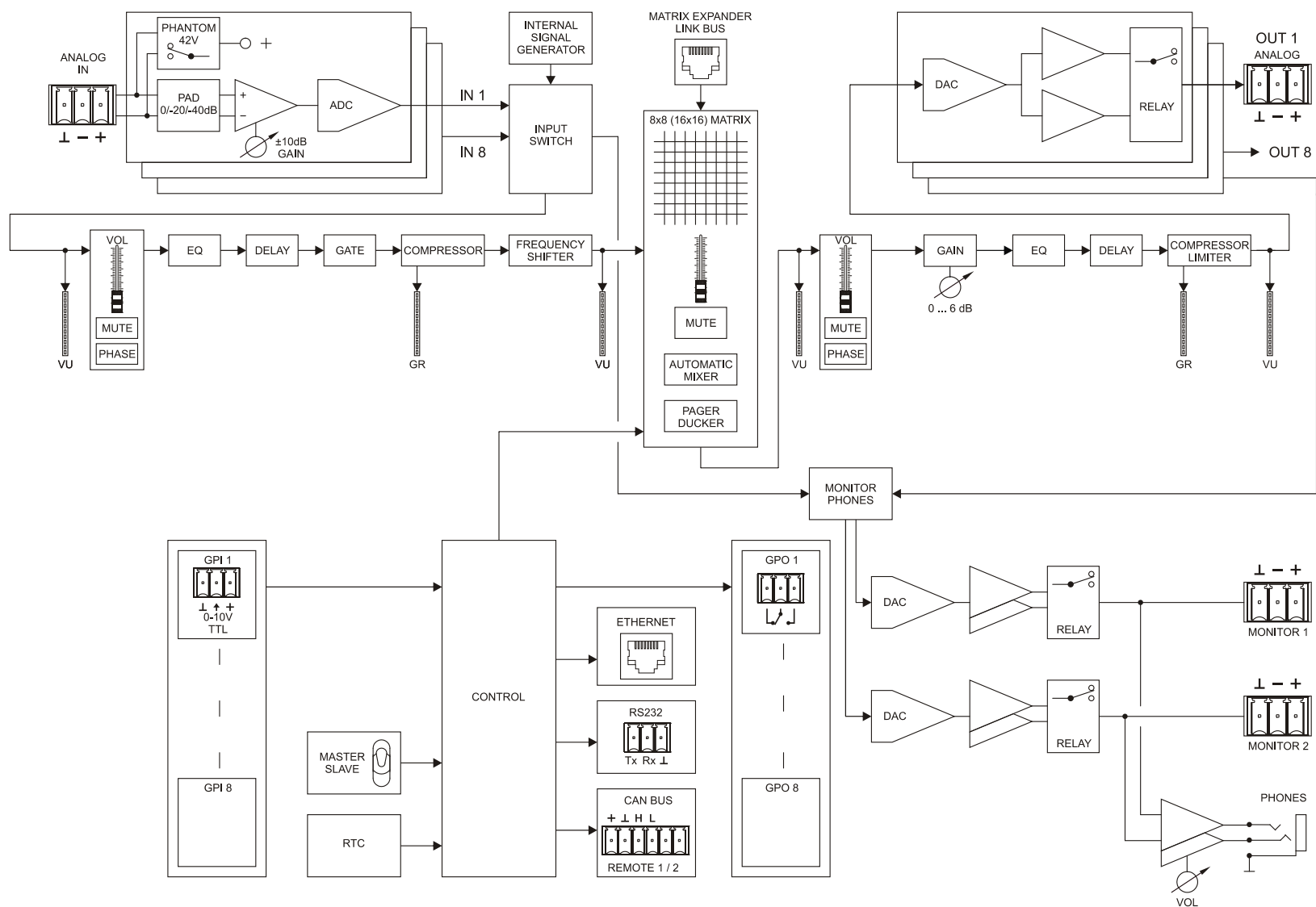
## Miscellaneous

Management Connectivity	Ethernet Base-Tx 10/100Mb Auto X-Over CAT5 up to 100m.
Expansion LINK BUS (16x16 ch.)	Proprietary over CAT5, Xover cable up to 100m.
Remote Bus	2, over twisted pairs; up to 1km (see specific specs.)
GPI	8, from 0 to 10VDC or TTL level
GPO	8, 3 poles isolated relay; 1A, 48VDC max.
Aux. Power Supply for Remotes & GPI	+12VDC, 1.2A. max. (short circuit protected)
Time and date retention (battery)	1 month aprox. (ambient temperature dependant)
RTC accuracy	±1 minute /year

## SOFTWARE

[EclerNet Manager](#)

## 10. BLOCK DIAGRAM



All product characteristics are subject to variation due to production tolerances. **NEEC AUDIO BARCELONA S.L.** reserves the right to make changes or improvements in the design or manufacturing that may affect these product specifications.

For technical queries contact your supplier, distributor or complete the contact form on our website, in [Support / Technical requests](#).

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