EXO — User Manual

Version 1.0.0

1. Overview

EXO is a four-channel Eurorack output module that converts Eurorack-format signals to balanced professional audio signals. It features level metering and display for each output channel via high-brightness 12-segment RGB LED bars, covering a scale from −16 dBu to +6 dBu.

Each bar includes:

- Two differentiated colour zones (safe and optimal).
- A configurable 0 dBu reference indicator.
- Bipolar peak indicator with hold.

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2. Key Features & Benefits

- Massive headroom for clean, undistorted signal handling even at high levels.
- Ultra-low noise and distortion for pristine audio performance.
- RF shielding on both inputs and outputs to prevent radio-frequency interference.
- Premium balanced output drivers delivering transformer-like interconnect performance.
- Compact design without compromising audio quality.
- ESD and phantom power protection for enhanced durability and touring reliability.

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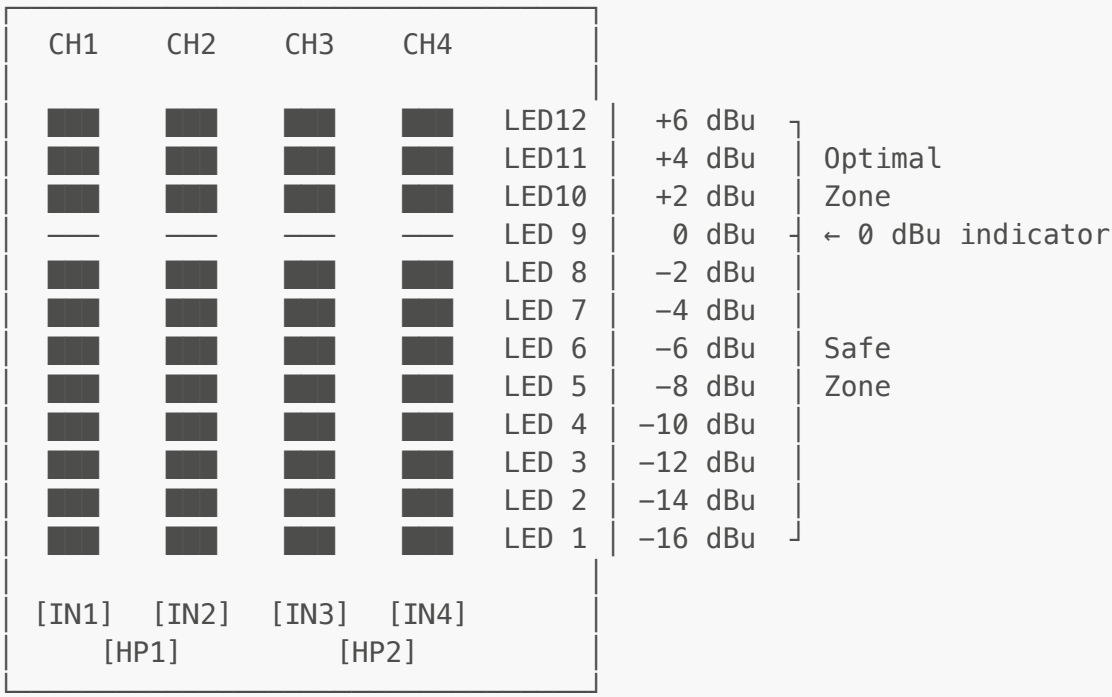
3. Panel Diagram



4. Connections

Connector	Description
IN 1 – IN 4	Eurorack analogue inputs (one per channel).
OUT 1 – OUT 4	Balanced professional audio outputs (one per channel).
HP 1	Headphone output 1 (channels 1 & 2), 3.5 mm stereo jack.
HP 2	Headphone output 2 (channels 3 & 4), 3.5 mm stereo jack.
Power	Standard Eurorack 16-pin connector (+12 V / –12 V / +5 V).

5. Headphone & Auxiliary Outputs

EXO features two high-performance headphone amplifiers:

Amplifier	Assigned channels	Connector
HP Amp 1	Outputs 1 & 2	3.5 mm stereo jack
HP Amp 2	Outputs 3 & 4	3.5 mm stereo jack

Each amplifier has an independent level control and can drive virtually any headphones regardless of impedance or driver technology. The 3.5 mm output can also be used as:

- Auxiliary stereo line output.
- Output for small passive speakers.

6. Level Display

6.1 LED Scale

Each 12-segment LED bar represents the following scale:

LED	Threshold (Vpp)	Level
12	4.374 V	+6 dBu
11	3.472 V	+4 dBu
10	2.758 V	+2 dBu
9	2.193 V	0 dBu
8	1.739 V	–2 dBu
7	1.382 V	–4 dBu
6	1.100 V	–6 dBu
5	0.871 V	–8 dBu

LED	Threshold (Vpp)	Level
4	0.693 V	–10 dBu
3	0.549 V	–12 dBu
2	0.436 V	–14 dBu
1	0.345 V	–16 dBu

6.2 Colour Zones

- **Safe zone** (LEDs 1 to 9): nominal working level.
- **Optimal zone** (LEDs 10 to 12): recommended peak level range.
- **0 dBu indicator** (LED 9): configurable permanent or soft-blinking visual reference.

6.3 Peak Indicator

The peak indicator is **bipolar**: it monitors both the positive and negative cycles of the signal. When the level exceeds **4.574 Vpp (~+6.38 dBu)**, LED 12 blinks **red** for approximately **1000 ms**.

7. Colour Profile Configuration

EXO allows independent colour scheme customisation for each channel. There are **7 predefined profiles** per channel. The configuration is saved to non-volatile memory and is retained after power-off.

7.1 Available Profiles

Profile	Safe Zone	Optimal Zone
0	Green/Yellow (default)	Red
1	White	Blue
2	Yellow	Magenta
3	Blue	White
4	White	Yellow
5	Cyan	White
6	White	Cyan

7.2 Enabling / Disabling the 0 dBu Indicator

When powering on or restarting the module, if any **headphone volume control button** is held, the state of the 0 dBu indicator is automatically toggled and saved.

- If the 0 dBu indicator was **enabled** → it is disabled.
- If the 0 dBu indicator was **disabled** → it is enabled.

Release the button after boot to enter normal operation.

7.3 Entering Colour Configuration Mode

To access the channel colour configuration mode:

1. Hold any **headphone volume control button** while powering on or restarting the module.
2. Keep it held for **5 seconds**.

The module will enter channel selection mode: all bars will show a preview of each channel's colour profile.

7.4 Navigation in Configuration Mode

Channel selection mode (bars blinking):

Volume button action	Effect
Short press	Advances to the next channel (1 → 2 → 3 → 4 → 1).
Long press	Enters profile selection mode for the active channel.

The selected channel is indicated by its bar blinking.

Profile selection mode (selected channel bar blinks dimmed):

Volume button action	Effect
Short press	Advances to the next colour profile. Saved to flash.
Long press	Returns to channel selection mode.

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8. Configuration Persistence

EXO saves to non-volatile flash memory:

- State of the 0 dBu indicator (enabled / disabled).
- Selected colour profile per channel.

The configuration is applied automatically on every boot.

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9. Electrical Characteristics

9.1 Power Supply

Parameter	Value
Supply voltages	+12 V, –12 V, (+5 V)
Total current consumption (+12 V + 5 V + –12 V)	110 mA
+12 V current consumption	52 mA
–12 V current consumption	58 mA
+5 V current consumption (bus only)	56 mA

Parameter	Value
Maximum current consumption	166 mA
Connector	Standard Eurorack 16-pin
Format	Eurorack 3U

9.2 Inputs

Parameter	Value
Number of channels	4
Maximum input level	20 Vpp
Optimal input level	10 Vpp
Input impedance	100 kΩ

9.3 Outputs

Parameter	Value
Number of balanced channels	4
Output impedance	600 Ω
THD @ 1 kHz	0.0008 %
Frequency response (–3 dB)	5 Hz – 35 kHz
Signal-to-noise ratio	–101 dBu
Crosstalk (adjacent channels)	–72 dBu
Maximum headphone output power	105 mW @ 16 Ω
Maximum operating temperature	70 °C

9.4 VU Meter

Parameter	Value
Segments per channel	12
Measurement range	–16 dBu to +6 dBu
Bipolar control precision (0.5 %)	–16 dBu to +6 dBu
0 dBu reference level	2.193 Vpp / 0.775 V RMS
Maximum peak level (full scale)	4.574 Vpp
Peak hold time	~1000 ms

10. Troubleshooting

Symptom	Likely cause / Solution
Bar with all LEDs fast-blinking	The channel has no valid calibration stored. Contact the manufacturer.
Colour profile changes do not persist	Profile selection was not completed. Repeat the procedure in section 7.4.
Cannot enter colour configuration mode	The module must boot with a volume button held for 5 s. Repeat the process.
The 0 dBu indicator changes state on its own at boot	A volume button was held during boot. The 0 dBu indicator toggle on boot is intentional.