

COMP16

S M A R T C O M P R E S S O R

HP4

H E A D P H O N E D I S T R I B U T I O N

A M P L I F I E R

EQ3B

3 B A N D P A R A M E T R I C E Q A L I Z E R

USERS MANUAL

Version 1.0

PreSonus Audio Electronics

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1 INTRODUCTION

1.1 INTRODUCTION

Thank you for purchasing this PreSonus Product. Your product was designed with you, the end user in mind.

This device was built with state of the art components to deliver crystal clear audio for an infinite period of time. We believe this unit to be an exceptional sounding unit at an exceptional price. We hope you agree. Feel free to contact us at 1-800-750-0323 anytime for any reason. We value your comments and suggestions.

Please pay close attention to how you connect your PreSonus Product to your system. Improper grounding is the most common cause of noise problems in both live and studio applications. We suggest you look at the application guides which are part of this manual to insure optimum operation.

Good luck and enjoy your PreSonus Product!

2.1 A WORD ABOUT COMPRESSION

Punch, apparent loudness, presence... just three of many terms used to describe the effects of compression/ limiting.

Compression and *limiting* are forms of dynamic range (volume) control. Audio signals have very wide peak to average signal level ratios (sometimes referred to as dynamic range which is the difference between the loudest level and the softest level). The peak signal can cause overload in the audio recording or reproduction chain resulting in signal distortion. A *compressor/limiter is a type of amplifier in which gain is dependent on the signal level passing through it*. You can set the maximum level a compressor/limiter allows to pass through, thereby causing automatic *gain reduction* above some predetermined signal level or *threshold*.

Compression refers basically to the ability to reduce the output level of an audio signal by a fixed ratio relative to the input. It is useful for lowering the dynamic range of an instrument or vocal, making it easier to record without distorting the recorder. It also assists in the mixing process by reducing the amount of level changes needed for a particular instrument. Take, for example, a vocalist who moves around in front of the microphone while performing, thus making the output level vary up and down unnaturally. A compressor can be applied to the signal to help correct this recording problem by reducing the 'louder' passages enough to be compatible with the overall performance.

How severely the compressor reduces the signal is determined by the compression *ratio* and compression *threshold*. A ratio of 2:1 or less is considered mild compression, reducing the output by two for signals greater than the compression threshold. Ratios above

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10:1 are considered *hard limiting*. Limiting refers to the point at which the signal is restrained from going any louder at the output.

The level of input signal at which the output is reduced is determined by the compression *threshold*. As the compression threshold is lowered, more and more of the input signal is compressed (assuming a nominal input signal level). Care must be taken not to 'over compress' a signal. Too much compression destroys the acoustical dynamic response of a performance. ('Over compression', however, is used by some engineers as an effect, and with killer results!)

Compressor/limiters are commonly used for many audio applications. A kick drum can get lost in a wall of electric guitars. No matter how much level is increased, the kick drum stays 'lost in the mud'. Add a touch of compression and tighten up that kick drum sound allowing it to 'punch' through without having to crank the level way up.

A vocal performance usually has a wide dynamic range. Transients (the very loudest portion of the signal) can be far outside the average level of the vocal signal. It is extremely difficult to ride the level with a console fader. A compressor/limiter automatically controls gain without altering the subtleties of the performance.

A solo guitar can seem to be masked by the rhythm guitars. Compression can make your 'lead' soar above the track without shoving the fader through the roof .

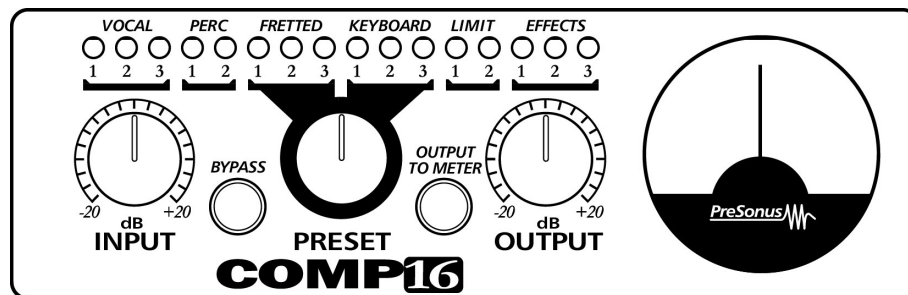
Bass guitar can be difficult to record . A consistent level with good attack can be achieved with proper compression . Your bass doesn't have to be washed out in the low end of the mix . Let the compressor/limiter give your bass the punch it needs to drive the bottom of the track .

2.2 COMP16 FRONT PANEL BASIC LAYOUT

The front panel on the COMP16 is divided into three sections. These are:

1. Presets:

Sixteen selectable preset positions.



The **Presets** for the COMP16 are controlled by this sixteen position rotary encoder. As the encoder is rotated, parameters are digitally switched, simultaneously controlling attack, release, ratio and threshold.

2. Controls:

The **Input** control adjusts the gain on the input amplifier. **Note: The input control is always active.**

3. Output & Pushbuttons

The Output control is used to set the desired output of the COMP16. It is sometimes referred to as 'gain makeup' control. This term is derived from the fact that as the

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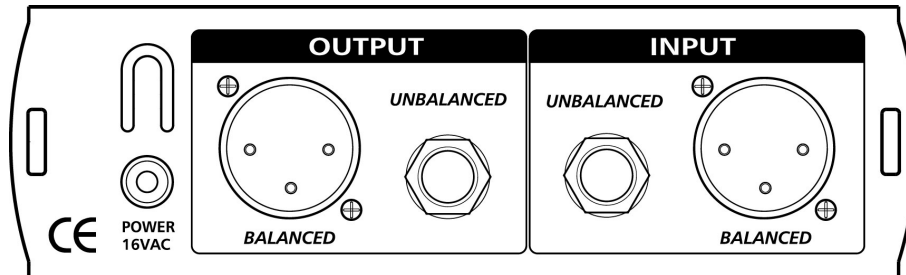
compressor lowers the output level during gain reduction, the overall signal level is lowered, requiring the user to 'makeup' the gain thereby restoring the original signal level.

Output to Meter

This button selects the function of the Output/Gain Reduction meter. Pushed out, the meter gives you the level of the gain reduction. Pushed in, the meter gives you the level of the signal after compression; the output level.

Bypass

If the BYPASS button is not pushed in, the COMP16 is processing the signal (compressing). When pushed in, the COMP16 is no longer compressing the signal, however the input gain setting remains active.



Input

The input jack accepts balanced/unbalanced tip-sleeve or tip-ring-sleeve connectors or XLR connectors. The input can handle up to +22dBu unbalanced levels.

Output

The output jack accepts (balanced/unbalanced) tip-sleeve, tip-ring-sleeve or XLR connectors. The output will deliver up to +22dBu in signal level unbalanced.

2.3 PRESETS

Vocal

1 **SOFT** - Easy compression. A low ratio setting for ballads allowing a wider dynamic range. Good for 'live' use. This setting lets the vocal sit 'in the track'.

Threshold	Ratio	Attack	Release
-8.2dB	1.8:1	0.002mS	38mS

2 **MEDIUM** - More limiting than preset 1 for a narrower dynamic range. It moves the vocal more up front in the mix.

Threshold	Ratio	Attack	Release
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-3.3dB	2.8:1	0.002mS	38mS
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3 **SCREAMER** - For loud vocals. Fairly hard compression for a vocalist who is 'on' and 'off' the microphone a lot. It puts the voice 'in your face'.

Threshold	Ratio	Attack	Release
-1.1dB	3.8:1	0.002mS	38mS

Perc.

1 **SNARE/KICK** - Allows the first transient through and compresses the rest of the signal giving a hard snap up front with a longer release.

Threshold	Ratio	Attack	Release
-2.1dB	3.5:1	78mS	300mS

2 **L/R (Mono) OVERHEAD** - A low ratio and threshold gives a 'fat' contour to even out the sound from overhead drum mics. Low end is increased and the overall sound is more present and less ambient. More 'boom' less 'room'.

Threshold	Ratio	Attack	Release
-13.7dB	1.3:1	27mS	128mS

Fretted

1 **ELECTRIC BASS** - A fast attack and slow release to tighten up the electric bass and give you control for more consistent level.

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Threshold	Ratio	Attack	Release
-4.4dB	2.6:1	45.7mS	189mS

2 **ACOUSTIC GUITAR** - This setting accentuates the attack of the acoustic guitar and helps maintain an even signal level keeping the acoustic guitar from disappearing in the track.

Threshold	Ratio	Attack	Release
-6.3dB	3.4:1	188mS	400mS

3 **ELECTRIC GUITAR** - A setting for 'crunch' electric rhythm guitar. A slow attack helps get the electric rhythm guitar up close and personal and gives punch to your crunch.

Threshold	Ratio	Attack	Release
0.1dB	2.4:1	26mS	194mS

Keyboards

1 **PIANO** - A special setting for an even level. Designed to help even up the top and bottom of an acoustic piano. Helps the left hand be heard with the right hand.

Threshold	Ratio	Attack	Release
-10.8dB	1.9:1	108mS	112mS

2 **SYNTH** - Fast attack and release for synthesizer horn stabs and for bass lines played on a synthesizer.

Threshold	Ratio	Attack	Release
-11.9dB	1.8:1	0.002mS	85mS

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3 **ORCHESTRAL** - Use this setting for string 'pads' and other types of synthesized orchestra parts. It will decrease the overall dynamic range for easier placement in the mix.

Threshold	Ratio	Attack	Release
3.3dB	2.5:1	1.8mS	50mS

Limit

1 **MONO LIMITER** - Just as the name implies. A hard limiter setting (brick wall) ideal for controlling level to the 2 track mixdown deck or Mono output.

Threshold	Ratio	Attack	Release
5.5dB	7.1:1	0.001mS	98mS

2 **CONTOUR** - A contoured setting for use on the Mono output to fatten up the mix.

Threshold	Ratio	Attack	Release
-13.4dB	1.2:1	0.002mS	182mS

Effects

1 **SQUEEZE** - Dynamic compression for solo work, especially electric guitar. It gives you that glassy 'tele/strat' sound. A true classic.

Threshold	Ratio	Attack	Release
-4.6dB	2.4:1	7.2mS	93mS

2 **PUMP** - Make the COMP16 'pump up the prime'. A setting for making the compressor pump in a desirable way. This effect is good for snare drum to increase the length of the transient by bringing the signal up after the initial spike. Very contemporary.

Threshold	Ratio	Attack	Release
0dB	1.9:1	1mS	0.001mS

3 Tamer – Tame that funky low end. Designed to help control low end transients. This setting is especially useful for Bass Guitar.

Threshold	Ratio	Attack	Release
-8dB	2:1	1mS	50mS

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2.4 APPLICATION GUIDE

QUICK START

1. Connect your COMP16 using one input jack (TS, TRS, or XLR) and one or more of the output jacks (TS, TRS, or XLR).
2. Select your preset. (Refer to the preset descriptions above. Remember that the Ratio, Attack and Release knobs are only active in Manual mode.)
3. Do not push the bypass button in.
4. Turn the Input knob all the way to -20 (counter-clockwise).
5. Set the Output knob on 0.
6. Slowly turn the Input knob up (clockwise) until the Gain Reduction meters begin to move. Continue to rotate the Input knob until the Gain Reduction meters read between -5 and -7.
7. Adjust the Output knob to the desired output level.

You should now have a very natural sounding compressed signal. Of course you should experiment with the settings to suit your taste.

BASIC CONNECTIONS

The COMP16 can be hooked to another processor, such as the EQ3B or TubePre in a live or studio environment. Please note that a microphone can not be plugged directly into the COMP16. The microphone has to be preamplified first. The TubePre would be a perfect preamp in front of the COMP16. We do recommend that whenever possible, balanced cables be used. Examples of balanced cables would be XLR or TRS (Tip – Ring – Sleeve). A balanced cable is preferred because it generally has a greater level of noise rejection. In other words it is less susceptible to outside interference.

Use with a Console/Mixer Insert

The COMP16 can be connected to an insert point on a console (mixer) by using a TRS Y-cable. This cable is Y-shaped, has a single TRS ¼" jack on one end and two ¼" TS (Tips-Sleeve) jacks on the other end. The single end will look like a stereo ¼" connector jack. This end of the cable plugs into the insert jack on the mixer channel. The other ends of the cable plug into the input and output of the EQ3B. If the EQ3B does not work immediately, you may want to try changing the jacks that are plugged into the input and output of the unit.

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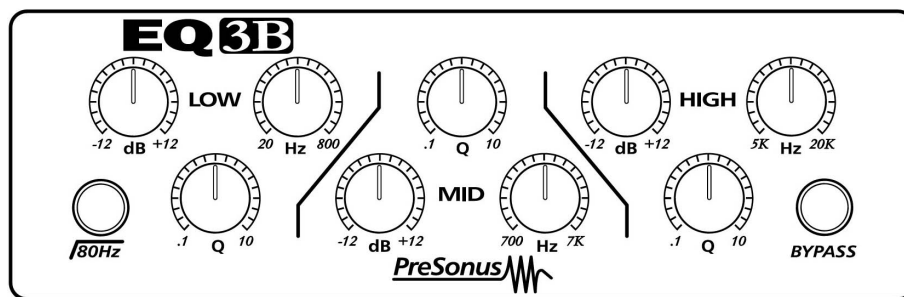
BASIC OPERATING PROCEDURES

Setting Compression Amount

Your COMP16 was designed with a *fixed threshold* mode of operation. This differs from other compressors in the fact that there is no threshold control. This offers the unique ability to immediately hear the sometimes subtle differences between presets which each have unique threshold settings. In setting the compression amount, always begin with the Input control all the way counter-clockwise (-20dB), and slowly increase the input until the Gain Reduction meters begin to register the compression activity. The more you crank up the Input the more compression your signal will experience. Always pay close attention to the best judge of your sound, your ear. You should also frequently remove the compression from the signal using the Bypass button to listen to the changes in your sound. In modern recording practice, it is customary to adjust the Output control such that the Input and Output level are of equal amounts according to the Output/Gain Reduction meter. This gives you an equal level output so that you can switch processing in and out to compare difference.

3.1 EQ3B FRONT PANEL BASIC LAYOUT

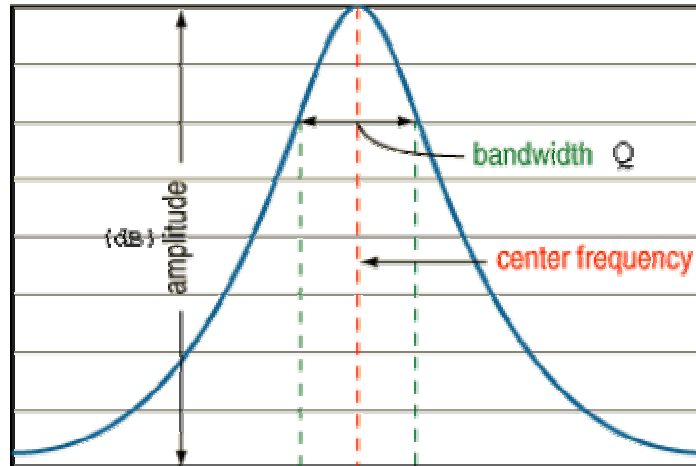
The front panel on the EQ3B is divided into three sections. These are the three bands of equalization:



There is a frequency selection knob (Hz), gain/gain reduction(dB) (amplitude) knob and a Q control. The frequency selection knob (Hz) allows the user to choose the center frequency of that band of the EQ. The Q knob allows the user to alter the width of the frequency being adjusted. Q is defined as the ratio of the center frequency divided by bandwidth. An example of how the width looks can be seen below in Figure 1. An example of use of high Q would be a “Notch Filter”. A Notch Filter is used to remove a small frequency range that may be annoying or unwanted. An example of wide width or low Q would be a bell. An example of using a bell would be a low end roll off. Let’s say that a person is performing live and the low end is too overpowering. The engineer or sound person could set the Q at 0.1, frequency at 80Hz and the gain reduction to -12. This would enable that person to lower a wide frequency range fairly quickly. The Gain/Gain Reduction knob (dB) allows the user to raise or lower the amplitude (peak) of the chosen frequency.

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Figure1

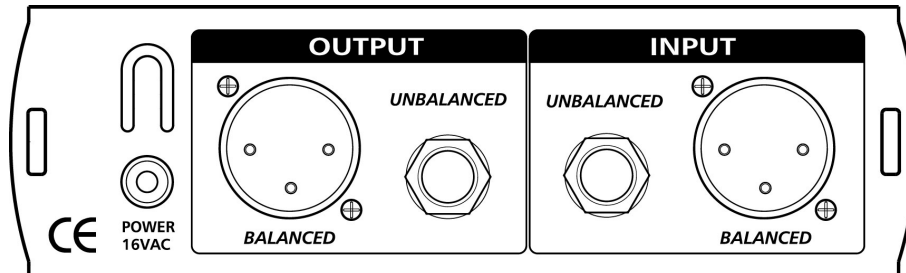


Bypass

If the BYPASS button is not pushed in, the EQ3B is processing the signal (equalizing). Pushed in, the EQ3B is no longer equalizing the signal.

80Hz

The 80Hz button is a low end roll off filter. When pushed in, the 80Hz button causes all frequencies below 80Hz to be attenuated (dropped) by 12dB. This filter can be handy in several live and studio applications. One instance would be for use on a vocal. The 80Hz filter would help reduce the “boominess” of a deep vocal.



Input

The input jack accepts balanced/unbalanced tip-sleeve or tip-ring-sleeve connectors or XLR connectors. The input can handle up to +24dBu unbalanced levels.

Output

The output jack accepts (balanced/unbalanced) tip-sleeve, tip-ring-sleeve or XLR connectors. The output will deliver up to +24dBu in signal level unbalanced.

3.2 APPLICATION GUIDE

The EQ3B can be hooked to another processor, such as the COMP16 or TubePre in a live or studio environment. We do recommend that whenever possible, balanced cables be used. Examples of balanced cables would be XLR or TRS (Tip – Ring – Sleeve). A balanced cable is preferred because it generally has a greater level of noise rejection. In other words it is less susceptible to outside interference.

Use with a Console/Mixer Insert

The EQ3B can be connected to an insert point on a console (mixer) by using a TRS Y-cable. This cable is Y-shaped, has a single TRS 1/4" jack on one end and two 1/4" TS (Tips-Sleeve) jacks on the other end. The single end will look like a stereo 1/4"

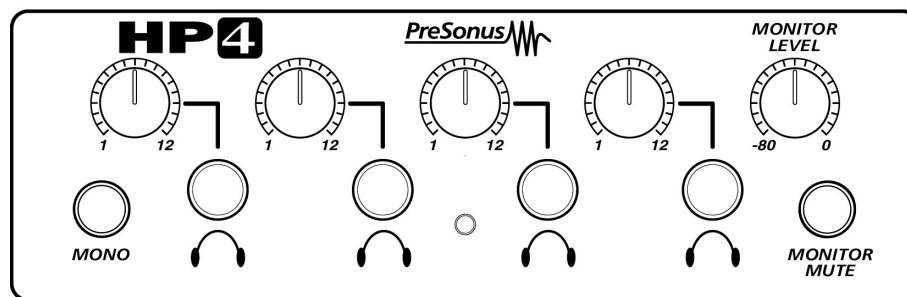
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connector jack. This end of the cable plugs into the insert jack on the mixer channel. The other ends of the cable plug into the input and output of the EQ3B. If the EQ3B does not work immediately, you may want to try changing the jacks that are plugged into the input and output of the unit.

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4.1 HP4 FRONT PANEL BASIC LAYOUT

The front panel on the HP4 is divided into three sections. These are the potentiometers (knobs), headphone jacks, and buttons:



Headphone Volume

The HP4 has the potential to be very loud (it goes to 12). Please be careful when you first start passing sound through the unit. It is generally a good idea to start with the volume set at 1 and then bring the volume up.

Monitor Level

The monitor level knob corresponds to the output volume of the output on the back of the HP4. The level can be muted by pressing the Monitor Mute button.

Mono

When the Mono button is pushed in, each input will be summed together on each output. For example, if you plug a CD player into the left input and press the mono button, the signal from the left input will be present in the left and right headphone and master output. When the Mono button

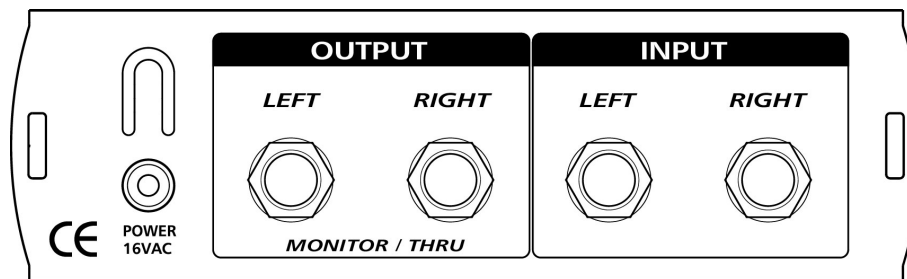
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is not pushed in, the left output will have the left input signal and vice-versa.

Monitor Mute

The monitor mute button is handy when you are only using the headphone outputs and don't want to use the Master Outputs. Also, it enables the user to hit one button rather than turn down the volume knob for the Monitor Level. A good use of this button would be for recording in front of a computer or DAW. When a mic is on, the Monitor Mute button would be pushed in to prevent feedback. When the recording/performance is over, the mic could be muted and then the Monitor Mute button would be disengaged.

4.1 BACK PANEL BASIC LAYOUT



Input

The input jack accepts balanced/unbalanced tip-sleeve or tip-ring-sleeve connectors. The input can handle up to +24dBu unbalanced levels.

Output

The output jack accepts (balanced/unbalanced) tip-sleeve or tip-ring-sleeve. The output will deliver up to +24dBu in signal level unbalanced. These outputs are designed to be

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connected to the power amp of your studio speakers, to the inputs of self amplified speakers, or to another HP4.

4.2 APPLICATION GUIDE

The HP4 can be hooked to another processor, such as the COMP16 or TubePre in a live or studio environment. We do recommend that whenever possible, balanced cables be used. An example of a balanced cable would be a TRS (Tip – Ring – Sleeve). A balanced cable is preferred because it generally has a greater level of noise rejection. In other words it is less susceptible to outside interference.

Use with a Console

The HP4 can be connected to the headphone output of a console/mixer to multiply the headphone outputs. Care should be taken that the headphone output level of the console/mixer is not set to high. Setting the output level to the HP4 too loud, could cause the unit to distort. The monitor outputs are designed to be connected to the power amp of your studio speakers, to the inputs of self amplified speakers, or to another HP4.

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5.1 COMP16 SPECIFICATIONS

Number of Channels.....	1
Dynamic Range	>115dB
Signal to Noise Ratio	>95dB
Headroom.....	+22dBu
Frequency Response	10Hz to 50kHz
Compression Ratio	1:1 to 20:1
Compressor Attack Time	0.01mS to 100mS
Compressor Release Time	10mS to 500mS
XLR Input Impedance	10kOhms
TRS Input Impedance.....	10kOhms
XLR Output Impedance	51Ohms
TRS Output Impedance	51Ohms
THD + Noise.....	<0.05%
Input Gain.....	-20dB to +20dB
Output Gain.....	-20dB to +20dB
Compressor Metering	Output Level, Gain Reduction
Internal Operating Level	0dBu = 0dB
Input Connectors14", Tip Ring Sleeve, XLR
Output Connectors.....	.14", Tip Ring Sleeve, XLR
Power Supply	External, Linear Supply
Power Requirements	16VAC,1000 mA 20W
Weight.....	4lbs.
Size	5.5"X5.5"X1.75"

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5.2 EQ3B SPECIFICATIONS

Number of Channels	1
Dynamic Range	>115dB
Signal to Noise Ratio	>95dB
Headroom.....	+22dBu
Frequency Response	10Hz to 50kHz
XLR Input Impedance	10kOhms
TRS Input Impedance.....	10kOhms
XLR Output Impedance	51 Ohms
TRS Output Impedance	51 Ohms
THD + Noise.....	<0.002%
Internal Operating Level	+0dBu = 0dB
Input Connectors	1/4", Tip Ring Sleeve, XLR
Output Connectors.....	1/4", Tip Ring Sleeve, XLR
Power Supply	External, Linear Supply
Power Requirements	16VAC, 1000mA, 20 Watts
Weight.....	4 lbs.
Size	5.5"X5.5"X1.75"

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5.3 HP4 SPECIFICATIONS

Number of Channels	1 in 5 out
Dynamic Range	>115dB
Signal to Noise Ratio	>95dB
Headroom	+22dBu
Frequency Response	10Hz to 50kHz
Input Impedance	10kOhms
Master Output Impedance.....	51 Ohms
THD + Noise	<0.002%
Internal Operating Level	+0dBu = 0dB
Headphone Output Power.....	150mW
Input Connectors	1/4", Tip Ring Sleeve
Master Output Connectors	1/4", Tip Ring Sleeve
Power Supply	External, Linear Supply
Power Requirements	16VAC, 1000mA, 20 Watts
Weight.....	4 lbs.
Size	5.5"X5.5"X1.75"