E11EVEN

//SOUND *BY* DAS AUDIO

User's Manual

iO-48 Digital Signal Processor

Deliver the Nightclub Sound Experience we all Deserve   **www.11sound.com**

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SAFETY PRECAUTIONS

Terminals marked with the lightning symbol carry electrical current of sufficient magnitude to constitute risk of electric shock. Use only high quality cables with plugs pre-installed. All other installation or modification should be performed only by qualified personnel. This symbol, wherever it appears, alerts you to the presence of un-insulated dangerous voltage inside the enclosure - voltage that may be sufficient to constitute a risk of shock. This symbol, wherever it appears, alerts you to important operating and maintenance instructions in the accompanying literature.

Please read the manual.

Caution:

To reduce the risk of electric shock, do not remove the top cover (or the rear section). No user serviceable parts inside. Refer servicing to qualified personnel.

Caution: To reduce the risk of fire or electric shock, do not expose this appliance to rain and moisture. The apparatus shall not be exposed to dripping or splashing liquids and no objects filled with liquids, such as vases, shall be placed on the apparatus.

Caution: These service instructions are for use by qualified service personnel only. To reduce the risk of electric shock do not perform any servicing other than that contained in the operation instructions. Repairs have to be performed by qualified service personnel.

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 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 plugs, convenience receptacles, and the point where they exit from the apparatus.

11.   Use only attachments/accessories specified by the manufacturer.

12 .   Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

13.   Unplug this apparatus during lightning storms or when unused for long periods of time.

14.   Refer all servicing to qualified service 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.

15.   The apparatus shall be connected to a MAINS socket outlet with a protective earthing connection.

16.   Where the MAINS plug or an appliance coupler is used as the disconnect device, the disconnect device shall remain readily operable.

17.   Correct disposal of this product: The wheeled bin symbol indicates that this product must not be disposed of with household waste. Please refer to the WEEE page of this manual.

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DECLARATION OF CONFORMITY

DAS Audio Group, S.L.

C/ Islas Baleares, 24 - 46988 - Pol. Fuente del Jarro - Valencia. España
(Spain) as E11EVEN Sound System´s supplier:

Declares that:

The following products: iO-48

Are manufactured in accordance with EMC Directive 2014/30/EU, in compliance with the following technical regulations: EN55103-1:2009, EN55103-2:2009 and in accordance with the Low Voltage Directive 2006/95/EC, in compiance with technical regulations: EN/IEC60065:2014

WARRANTY

All our products are warrantied against any manufacturing defect for a period of 36 months from date of purchase. The warranty excludes damage from incorrect use of the product.

All warranty repairs must be exclusively undertaken by the factory or any of its authorised service centers.

To claim a warranty repair, do not open or intend to repair the product.

All the details related to the warranty (such as extended warranties) can be found in the SUPPORT section on our website: **www.11sound.com**

THANK YOU

Thank you for choosing an E11EVEN Sound product for your application. Please spend a little time reading through this manual so that you can obtain the best possible performance from the unit. All E11EVEN products are carefully designed and engineered for cutting-edge performance and world-class reliability. If you would like further information about this, or any other E11EVEN product, please do not hesitate to contact us.

UNPACKING THE UNIT

After unpacking, please check the unit carefully for any damage. If any is found, immediately notify the carrier concerned - you, the consignee, must instigate any claim. Please retain all packaging, in case of future re-shipment.

INSTALLATION

- Electrical Considerations:

The **iO-48** device has been manufactured to comply with your local power supply requirements, but before connecting the unit to the supply, ensure that the voltage (printed on the rear panel) is correct, and that a main fuse of the correct type and rating has been fitted. Make sure power outlets conform to the power requirements listed on the back of the unit. Damage caused by connecting to incorrect AC voltage is not covered by the warranty.

- Mechanical Considerations:

To ensure that this equipment performs to specification, it should be mounted in a suitable rack or enclosure. When mounting the unit in a rack or enclosure, ensure that there is adequate ventilation. The cooling fan sucks cool air in through the right side and blows warm air out of the left side of the unit through the ventilating grills. Take care when mounting other equipment in the same rack.

- Operation:

Read all documentation before operating your equipment and retain all documentation for future reference. Do not spill water or other liquids into or on the unit and do not operate the unit while standing in liquid. Do not block the fan intake or operate the unit in an environment that could impede the free flow of air around the unit. If the unit is used in an extremely dusty or smoky environment, it should be cleaned of any collected debris at regular intervals.

INTRODUCTION

The **iO-48** is a very powerful high-end audio processor, ideally suited for install applications, where it combines the functions of a multitude of conventional products in a compact 1U unit with extensive remote control capabilities over ethernet.

It is important to remark that there are not any front/rear panel controls in the unit. It MUST be controlled using the 11-NET software always.

To achieve the best flexibility and audio performance, the iO-48 units have four analog audio inputs and eight analog audio outputs which can be configured in a selection of basic crossover modes – 2 x 4 way; 4 x 2 way; 2 x 3 way + 2 Aux and 1 x 8 way (as applicable to i/o configurations). It also offers a "free assign; matrix" mode which allows completely flexible routing and gain adjustments of any input routed to any output.

Flexible channel linking enables quick and easy configuration of common crossover setups or customized configurations as required.

Compressors are available on every input as well as a high pass filter, 8 bands of parametric EQ, 3 bands of dynamic EQ, a 28-band graphic EQ, and up to 1.3 seconds of delay.

Every output channel has high and low pass filters, 16 bands of parametric EQ, up to 1.3 seconds of delay as well as a new limiter designed to offer the best driver protection with the lowest distortion.

The **iO-48** runs at a fixed sampling rate of 96kHz.

The Ethernet based computer control software gives you the ability to not only control all the devices on a network but also to store preset memories and configure systems offline.

Key Features

Works in Windows, Android (tablets), Mac OS and iOS (ipad), iPadOS

4 Analogue Inputs, 8 Analogue Outputs

Sample rate fixed at 96kHz

Input Processing Features:

- Soft Knee Compressor
- 8 Parametric Eqs
- 24dB/Oct HPF
- 3 bands of Dynamic EQ
- 28-band Graphic EQ
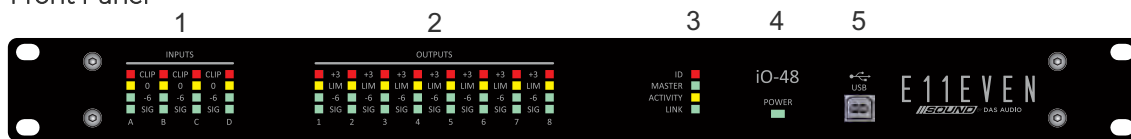- Gain, Polarity, Delay

Routing Matrix Modes:

- Mix Matrix
- Routing Matrix
- Preset Configurations (2x4, 4x2, 1x8, 2x3+2)

Output Proceswsing Features:

- 16 Parametric Eqs
- Crossover Filters up to 48dB/Oct
- Gain, Polarity, Delay, Limiter
- Remote control via 100Mbps Ethernet, USB Type B
- Up to 30 presets may be stored for offline recall

UNIT OVERVIEW

Front Panel

1.   Input Meters:

Real time LED input meters show level from maximum input level (clip) in 4-segments... Signal present, 6dB below clipping, 0dB/maximum input level and clip*.

*If analogue input clipping is neared by 1dB, the red input Clip LED will illuminate to show this.

2.   Output Meters:

Real time LED output meters show level from the limiter threshold in 4-segments... Signal present, 6dB below limiter threshold, Limiter threshold and 3dB into limiting. Note: The red limiter +3 LED will also illuminate if this output is muted.

3.   Comms:

ID: Flashes when the 'ID' button is clicked on a connected device within the D-Net software. Master: [for future use] Activity: Flashes when communication is taking place between the device and D-Net software. Link: Illuminates when a suitable Ethernet connection is established.

4.   Power Light:

Illuminates when a suitable power source is connected and the unit is powered on.

5.   USB port:

USB type B port for single unit connection to a computer running the D-Net software.

Rear Panel

1.   Main Power Inlet, Fuse and Power Switch:

3-pin IEC input, fused [5mm x 20mm, 3.15A, 250V, Anti-Surge (T)], 90-250VAC, 50-60Hz <40W.
A spare fuse is located within the fuse holder – only replace with the correctly rated fuse!

2.   Ethernet Computer Control Port:

Neutrik etherCON RJ45 network Ethernet port accepts either a standard CAT5 cable or housed RJ45 connector for connection to a computer (or suitable network switch to control multiple units simultaneously).

3.   Balanced Analogue Audio Outputs:

The analogue outputs are wired as follows: Pin 1: Shield/Ground Pin 2: Signal Hot (+) Pin 3: Signal Cold (-)

4.   Balanced Analogue Audio Inputs:

The analogue inputs are wired as follows: Pin 1: Shield/Ground Pin 2: Signal Hot (+) Pin 3: Signal Cold (-)

E11EVEN-NET CONTROL SOFTWARE

E11EVEN-NET is an Ethernet based computer control platform that gives the end user the ability to not only control all the devices on a network, but also to store presets and configure systems offline.
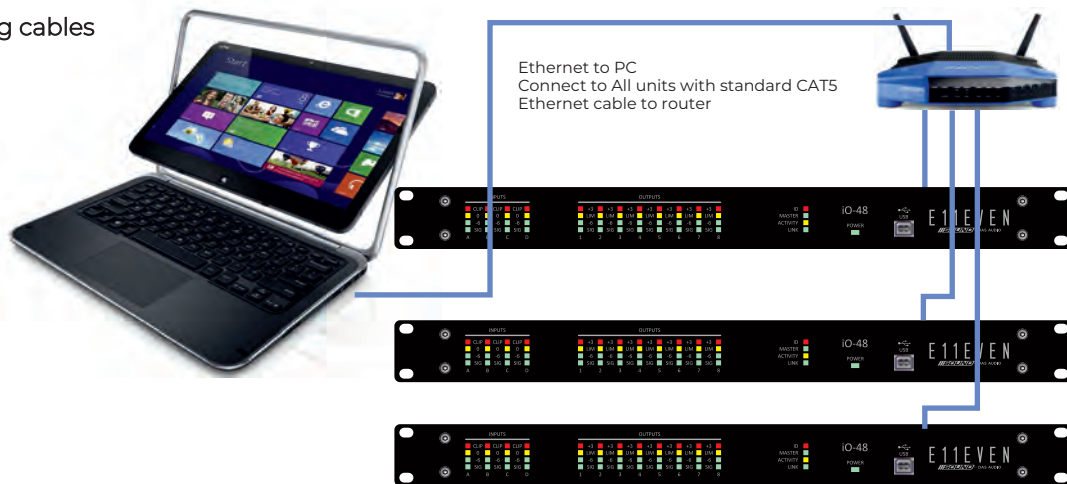
Compatibility with Microsoft Windows, Apple Mac and Apple iPad too, you can control your system the way that suits you. USB connection (Microsoft Windows only) is also available on some devices, allowing quick connection to a single device.

E11EVEN-NET is free for all E11EVEN Sound iO-48 user´s. It can be downloaded from the www.e11evensound.com web page.

The unit can be connected to the PC using an ethernet switch/router and the adequate ethernet cabling, or just using a standard USB cable.

If the router used is Wireless, the unit can be controlled via Wifi.

Using cables

Ethernet to PC
Connect to All units with standard CAT5
Ethernet cable to router

Wireless

Ethernet to PC (WiFi)
Connect to All units with standard CAT5
Ethernet cable to router

When using the iO-48 there are two basic procedures:

1.   Recalling a preset from the bank of memories included in the iO-48 units (also recalling an output channel preset). Each iO-48 unit comes with a bank of memories that includes different E11EVEN Sound systems and combinations of them.

2.   Creating a custom preset from an existing one; from the default settings or by recalling presets per output. The iO-48 units also have the possibility of recalling a preset per each output. These are called Output Channel Settings.

right mouse click

Follow this process to reach the option you desire:

Connect the iO-48 unit to the PC

or

Run the 11-NET control software

The preset needed is in the device   The preset needed is not in the device

Go "online"   The Software will find all   Creating a new preset ("offline")
Press the icon   the units on the network

Follow the process shown in the next pages to create a new custom preset from "zero":

Create preset (Routing/EQ/DEQ/GEQ)

Store File in the PC

Preset Recall

Go online

Send device settings from file to the units

Select one of the memories from the bank and press "recall"

Creating a new preset "offline"

D-Net allows the user to work "online" or "offline" with the devices. Working "offline" allows to create presets with filters, limiters, EQs etc. and later on when going "online" sending them to the unit(s).

Here it is shown the main window of the software. The "devices" can be distributed in "racks" or "zones" in the left area of the screen. To "add" or "delete" a "device" just use these options:

"add/delete" devices

When physically connected to a network of "devices" the user can directly Go "online" and the software will find all the units

"racks" or "zones" where to add devices
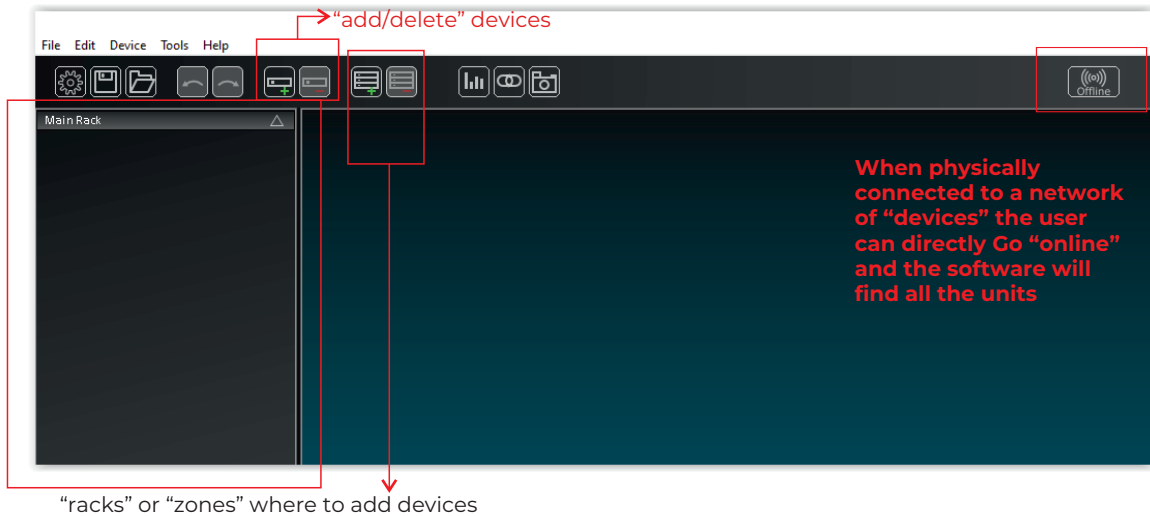
The user or application preferences are accessible in the ⚙ icon:

very useful option when working always in the same installation

When Going Online the software will:
- Get parameters from units
- Send parameters to untis
- Ask

Recommendation: ASK
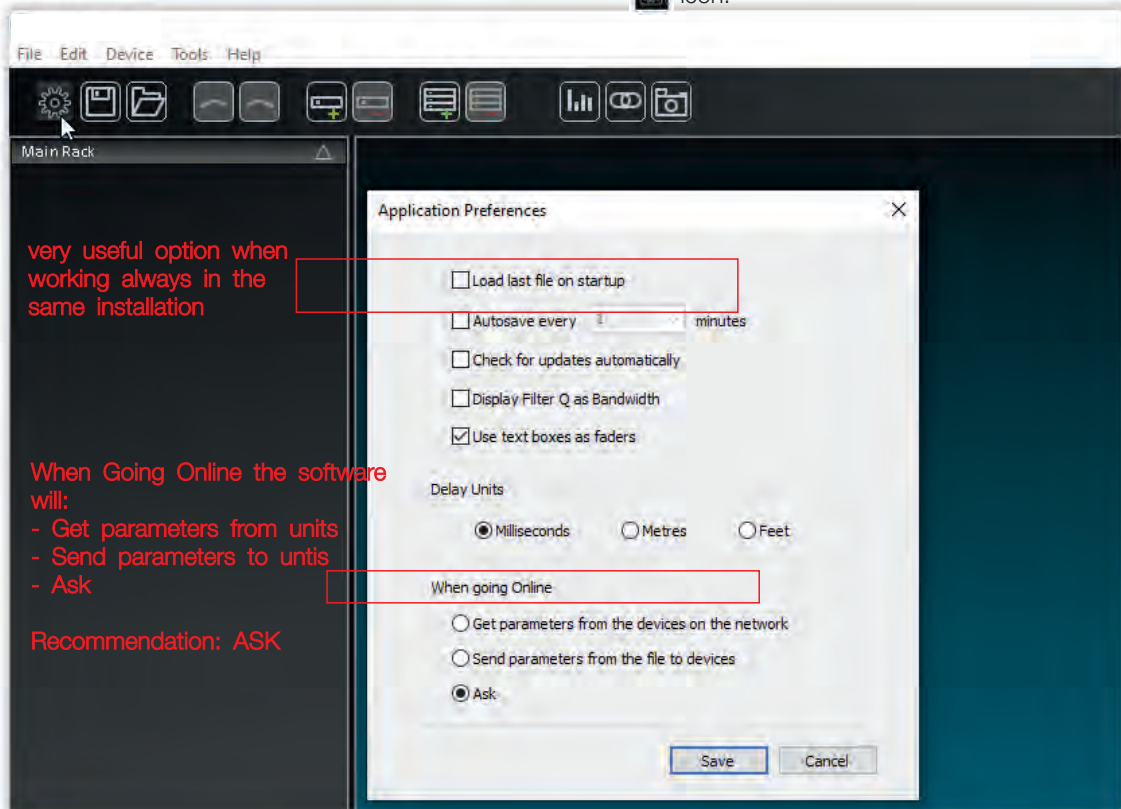
Between all these preferences the most important ones are the "Load last file on startup" which is very useful when connecting the PC always to the same network of processors or installation, and the selection "When going online".

There are 3 different options, "Get parameters form the units", will bring to the PC the existing settings in the "devices".
"Send parameters to the units" will do the opposite, it will "erase" all the settings in the device and substitute them by the ones existing in the computer. This option is very useful when working "offline" setting all the parameters first, and later "sending" them to all of the units for the first time, for instance.

We always recommend to use ASK all the times.

When working "offline" The user can "add" devices following this process: press + and select the iO-48 processor
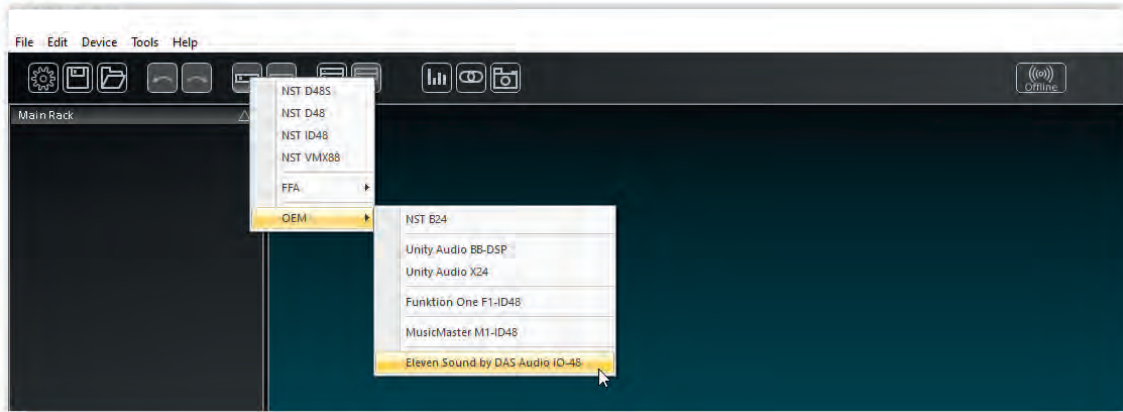
If there are no "racks" created, by default the "added" units are all included in the "Main rack":
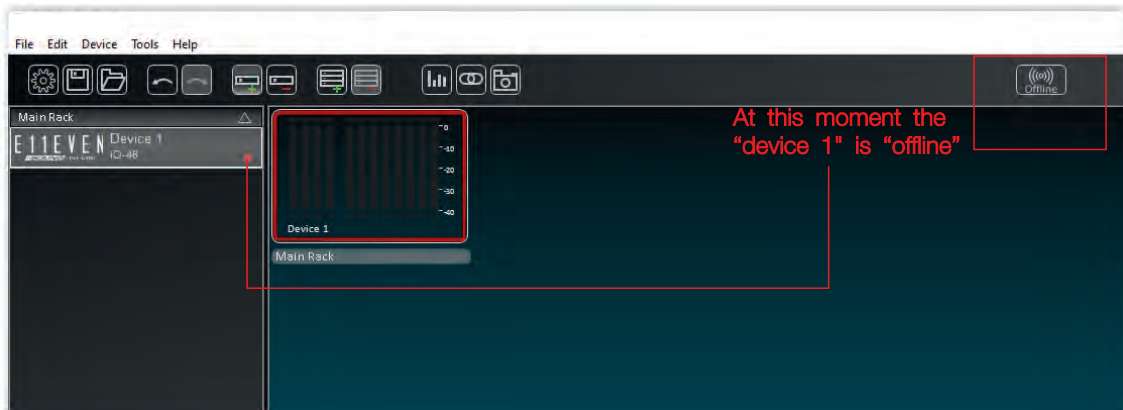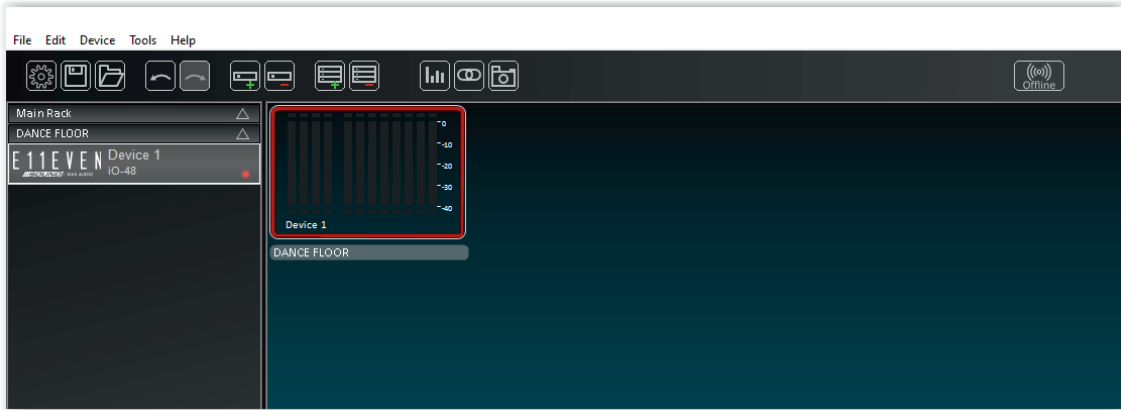

Let´s create another "rack" or "zone" for the Device 1:
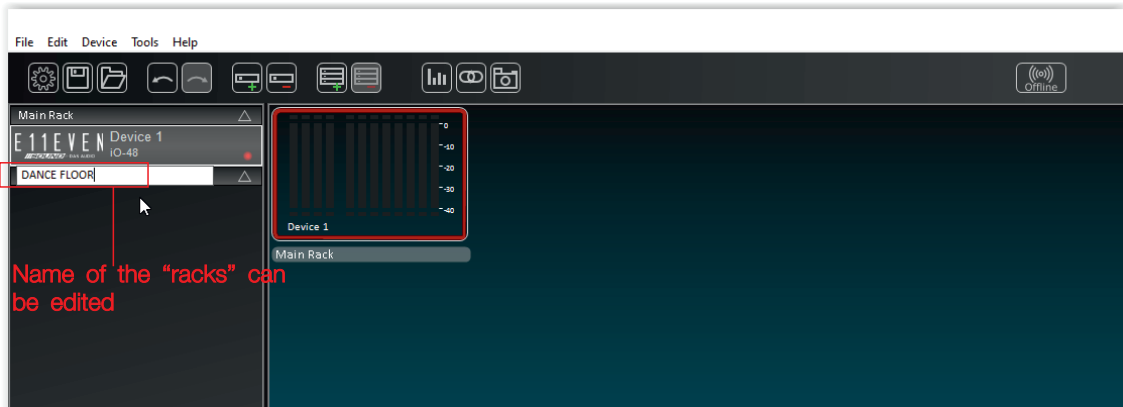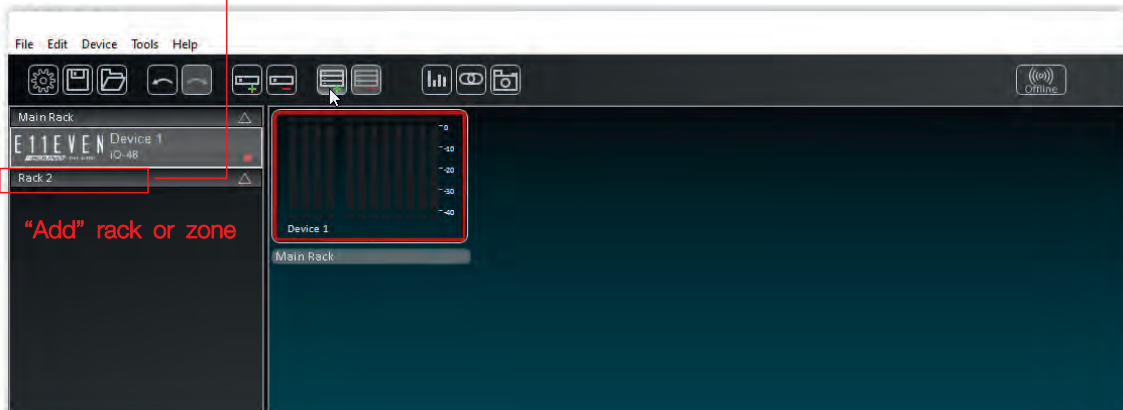
By Clicking on the Device and holding the left mouse you can "move" the devices from one rack to the other.

The "Device 1" has been moved to the "zone" named "DANCE FLOOR"

To access inside the "devices" double click on them; the main window of the device will appear:

inputs and outputs names can be changed

Inputs   Outputs

The name of the "device" can be also edited:

These are all the different "pages" showing all the editable parameters of the processor by blocks: Routing, Limiters, EQ (Equalization), DEQ (Dynamic Equalization), GEQ (Graphic Equalizer), Presets (Memory Recall/Store/Delete), System (IP Address, Firmware information), Monitor (Shows meters with respect to the limiter threshold) and Routing Wizard.

Next step will be defining the "routing" of the system. Click on the "Routing Wizard" and make your choice. In this case we are going to select a 2 x 4 way Crossover.

muted outs
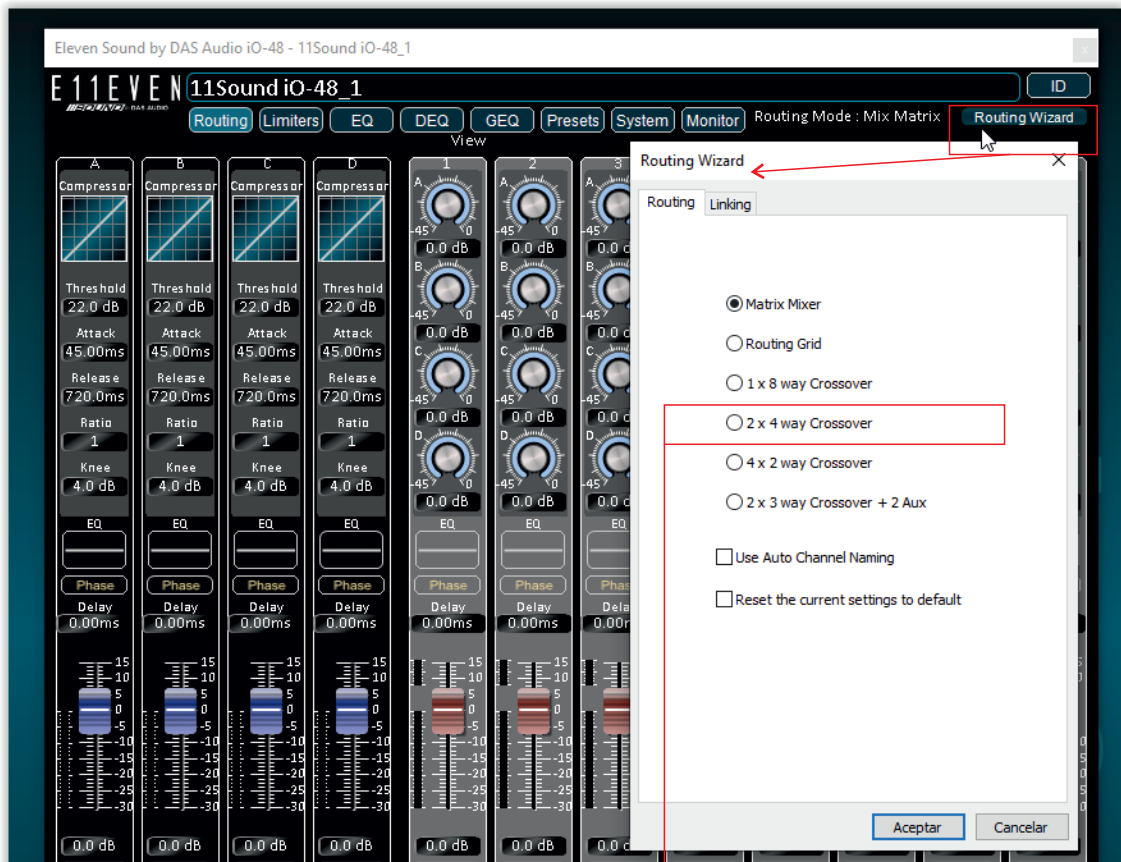
Keep in mind that when a standard 2x4 or 2x3 or 4x2 crossover is set up, the channels are automatically linked.

For instance, in a 2x4 configuration, channels 1 and 5 are linked, as well as channels 2&5, 3&6 and 4&8.

In the Routing screen, the user can select the input channels that are going to "feed" each output. In the image above, channels 1 to 4 use input A, and channels 5 to 8 use input B.

For each of the outputs, the user can edit the level, delay, phase (polarity) and channel name.

On the left side are shown the 4 possible inputs with the same parameters to be adjusted, level, delay, phase (polarity) and name.

There are different "pages" to access to all the parameters in the processor:
Routing, Limiters, EQ, DEQ, GEQ, Presets, System, Monitor.

The EQ page is divided in to blocks, Inputs (A, B, C, D) and Outputs (1, 2, 3, 4, 5, 6, 7, 8). It is shown in the image below the part that belongs to the inputs. For Each input there are available 8 EQ points plus a High Pass filter:
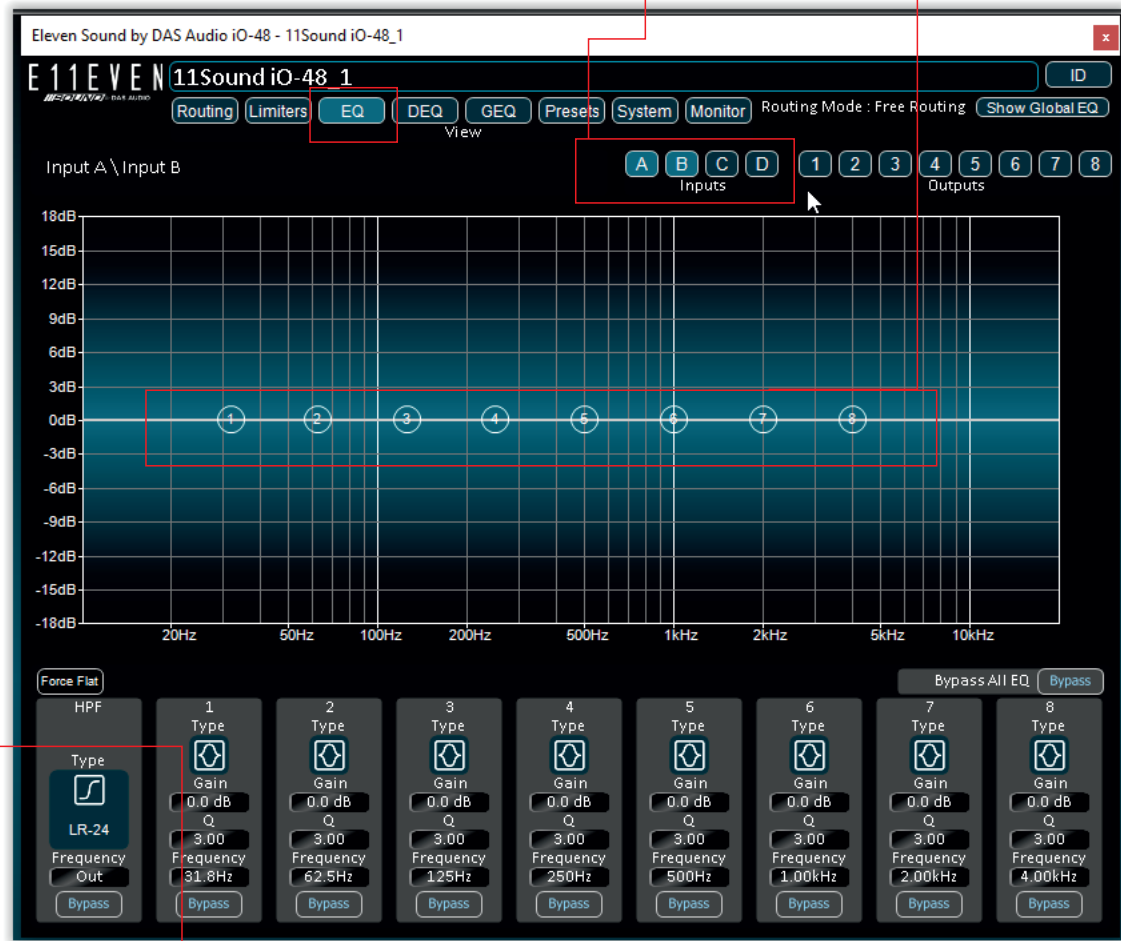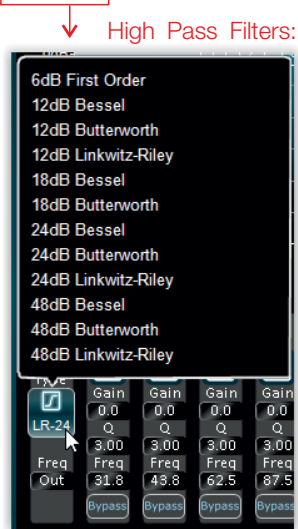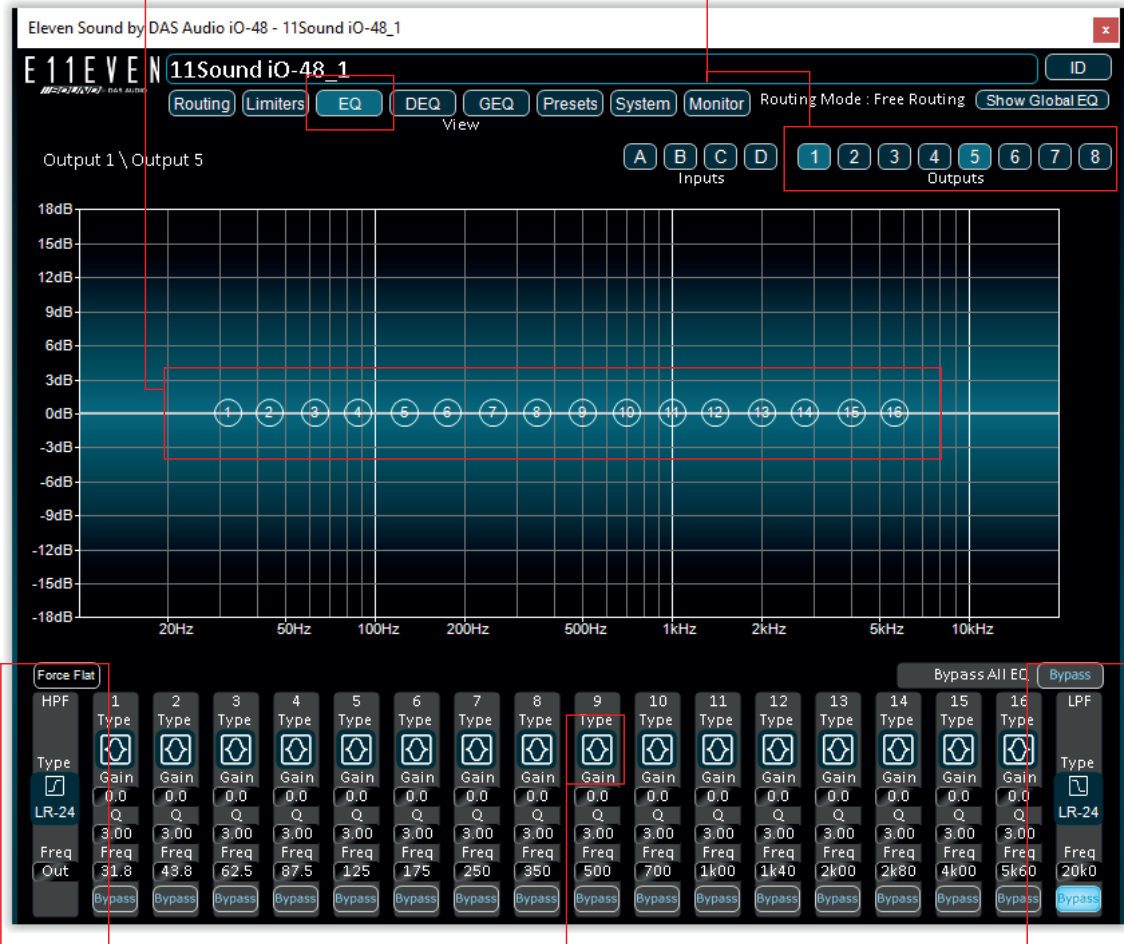

High Pass Filters:
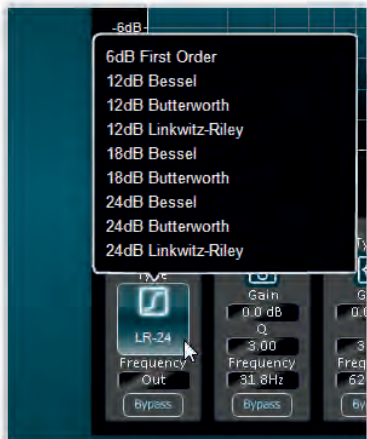
EQ types; to access to the different EQ formats, press first bypass, and later the icon
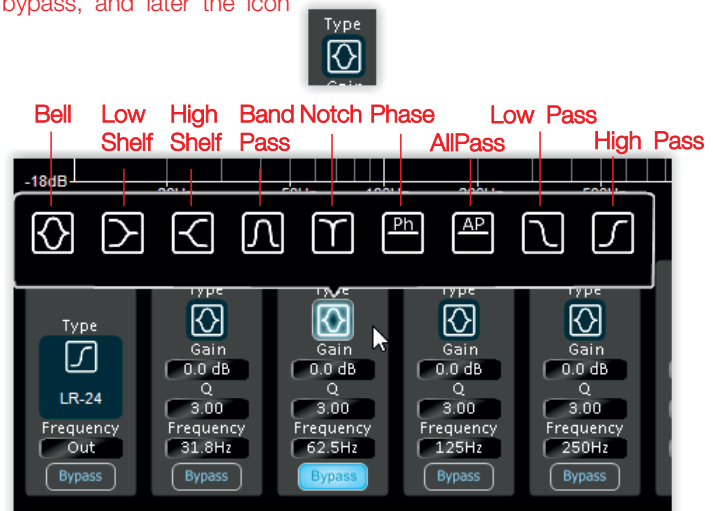
It is shown in the image below the part that belongs to the <u>outputs</u>. For Each output there are available 16 x EQ points plus a High Pass filter / Low Pass Filter:


High Pass Filters:

6dB First Order
12dB Bessel
12dB Butterworth
12dB Linkwitz-Riley
18dB Bessel
18dB Butterworth
24dB Bessel
24dB Butterworth
24dB Linkwitz-Riley
48dB Bessel
48dB Butterworth
48dB Linkwitz-Riley

Low Pass Filters:

6dB First Order
12dB Bessel
12dB Butterworth
12dB Linkwitz-Riley
18dB Bessel
18dB Butterworth
24dB Bessel
24dB Butterworth
24dB Linkwitz-Riley
48dB Bessel
48dB Butterworth
48dB Linkwitz-Riley

Bell   Low Shelf   High Shelf   Band Pass   Notch   Phase   AllPass   Low Pass   High Pass

Dynamic EQ is only available in the input channels (A, B, C, D).

Dynamic EQ block is basically a compressor or expander that can be set to respond and act upon only a certain range of frequencies. Its behaviour is dependant on the operating mode chosen (4 modes) – two of these are relatively traditional, whilst two modes offer the possibility to turn the normal action of compressors and expanders on their head to allow innovative adaptive control of the program material.
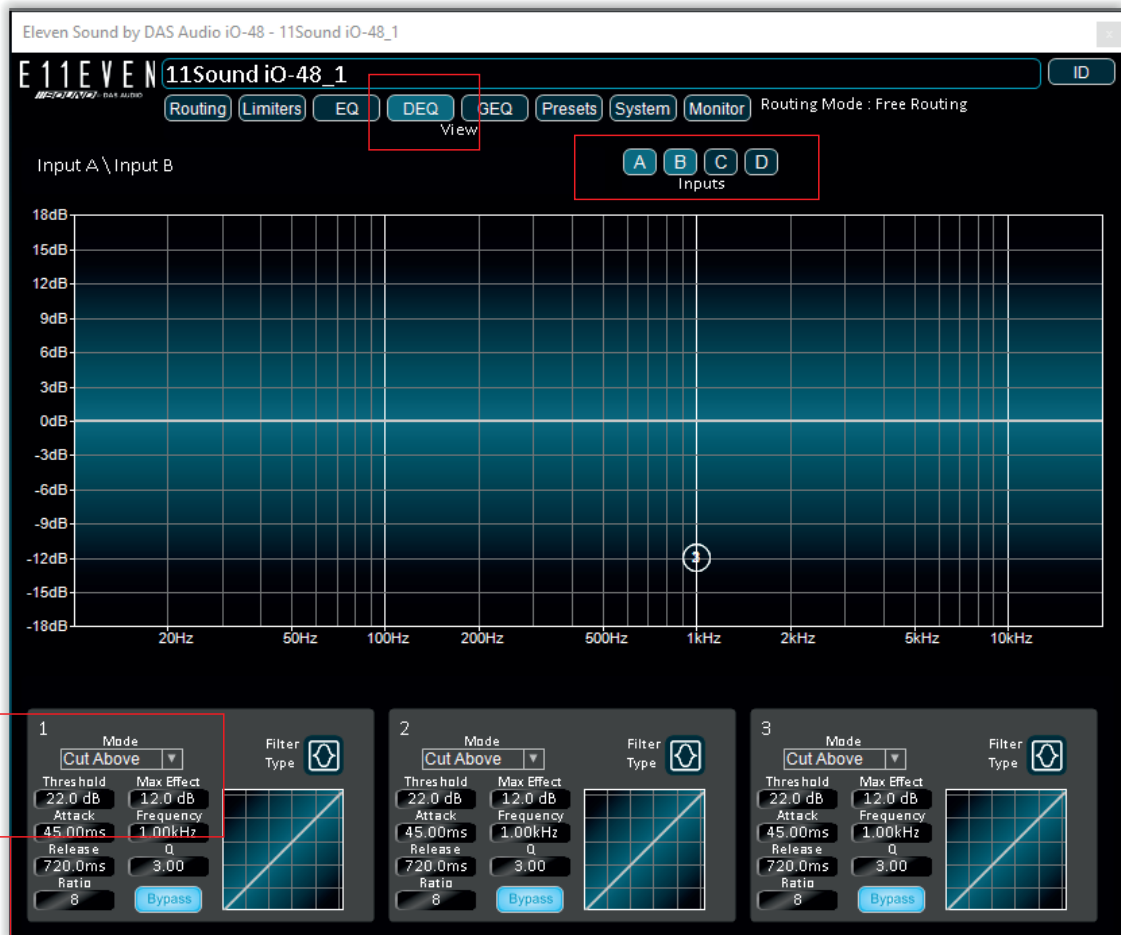
Dynamic EQ modes:
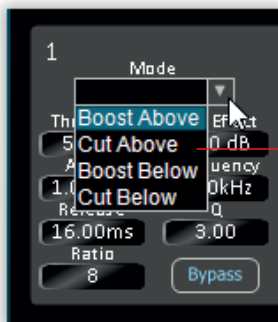
Cut above, frequency 2kHz:

Boost above, frequency 2kHz:
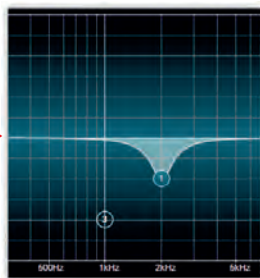
Cut Above:

When signal level has reached the threshold, all frequencies around 2kHz are going to be lowered by -6dB.

Signals below the threshold will pass unaltered, but as increasing signal is applied, those frequencies centered around 2kHz will be cut or compressed. This mode should be used in any instance where the desired result is to control a band of frequencies, such as de-essing, or de-popping, without affecting the surrounding frequency ranges.
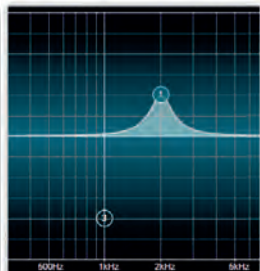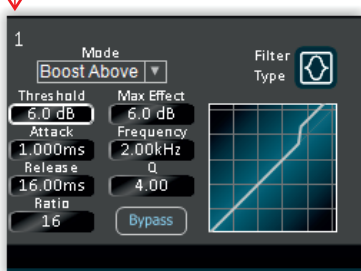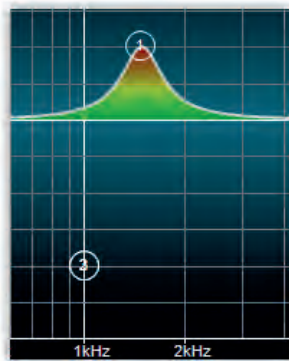
Boost Above:

When signal level is over the threshold, all frequencies around 2kHz are going to be boosted +6dB.

This mode is useful when the user wants to emphasize certain frequency range, for instance, voicing around 5kHz.
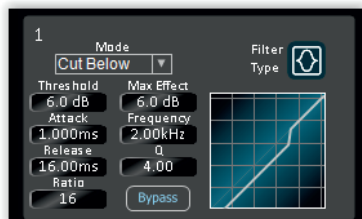
Boost below, frequency 2kHz:

Boost below:

As the signal drops below the threshold, the selected band of frequencies will be progressively boosted in relation to the rest of the spectrum, offering a perceived 'lift' in the band. Signals above the threshold pass unaltered.

One of the best uses of this mode is in the area of voice levelling and clarification.

Cut below, frequency 2kHz:
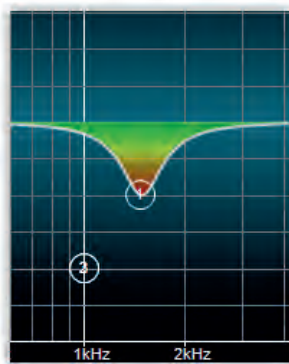
Cut below:

In this mode the dynamic EQ will act by cutting any frequencies present in that drop below the predetermined threshold.

Reducing the level of high frequency noise can be effectively implemented in this mode. Particularly effective on percussive material, unwanted tape noise and interference can be usefully removed without affecting the signal at normal levels.
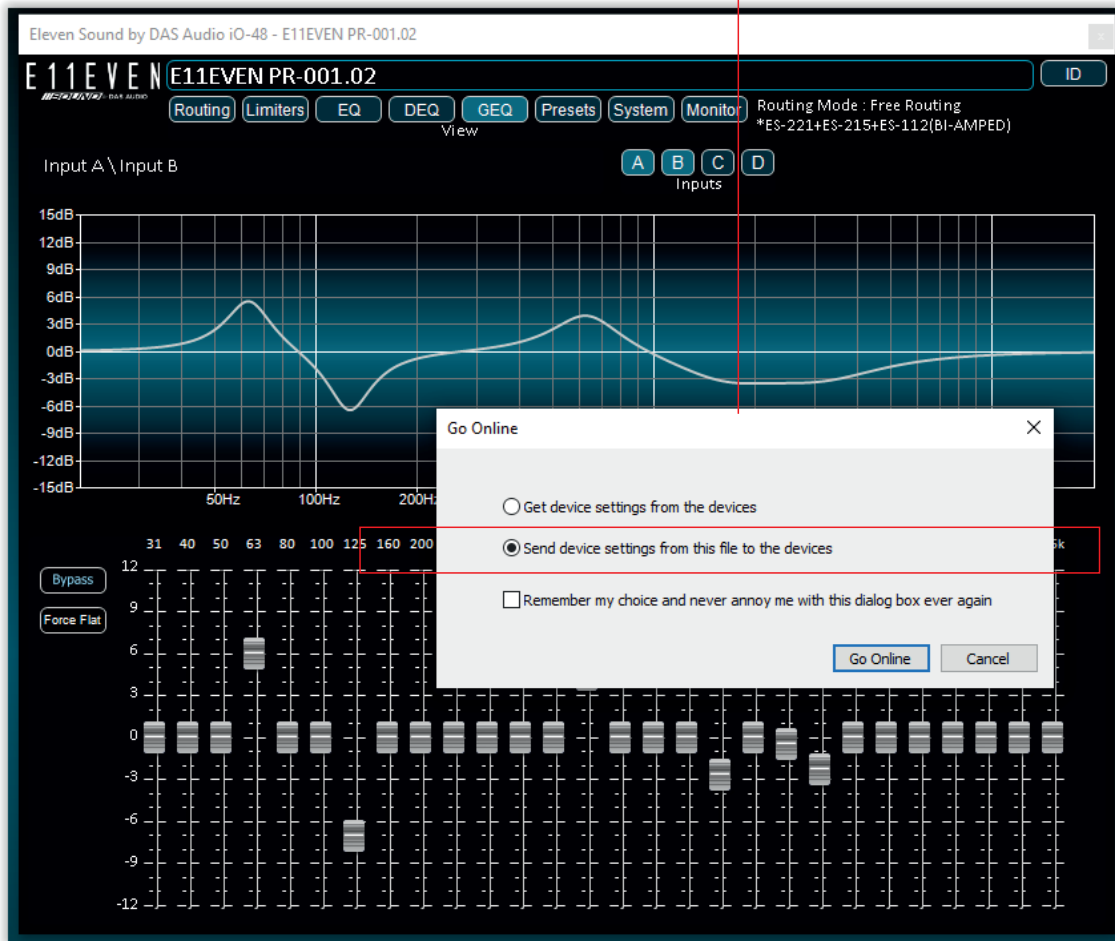
<u>Graphic 28 band Equalizer</u> is available also for all the inputs.
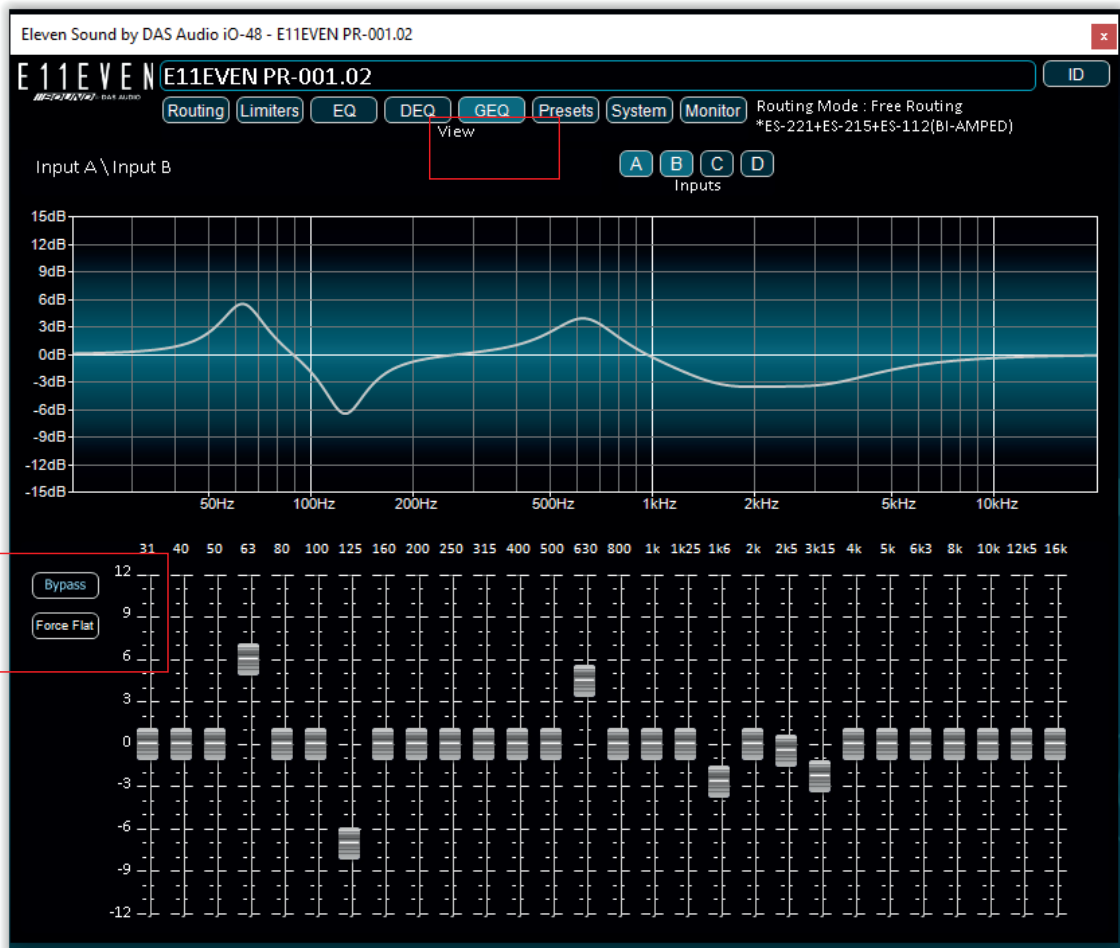
Bypass and Force Flat options
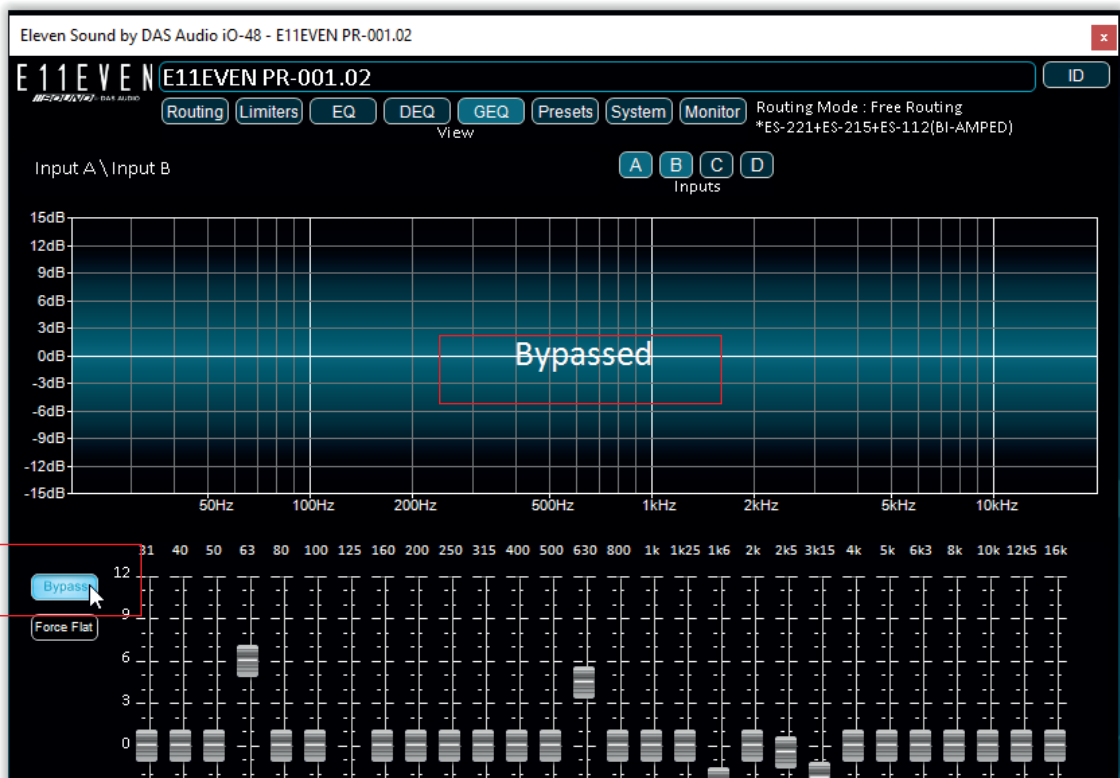
Once the Routing, EQ, GEQ, DEQ, has been defined user can store the file in the PC, and go "online" when needed. When going "online", this dialog will appear:


Select the option "Send device settings from this file to the devices".

This action will upload to the unit all the parameters (settings) previously defined offline on the software. At this point, it is advisable to store the settings in the device´s memory. Go to the Presets (1) page, select an available position (2) in the bank of memories and click store (3):

Presets can be stored, recalled, deleted and renamed in this page. When storing a preset the user can select options as "mute on recall". Be careful with this option.

As the device is has no controls at the front panel, the only way to unmute a preset would be using the software.

All E11EVEN Sound presets are stored unmuted.
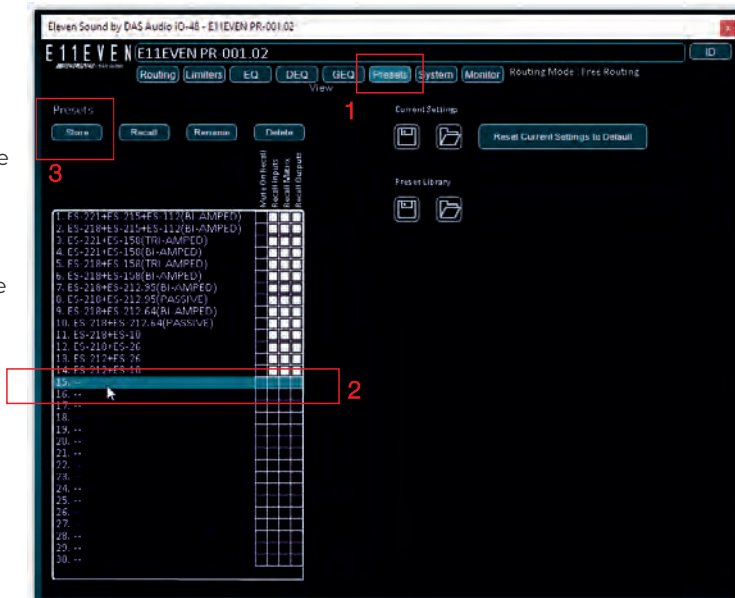
LIMITERS

The limiters built into the iO-48 processor are intended to be used for loudspeaker driver protection, as opposed to amplifier protection.

The following section describes how to set up the unit´s limiters to provide exceptional protection against driver overheating and cone over-excursion. Most speaker systems are given a power rating in Watts RMS. This is the maximum continuous power that the system will handle and often appears very conservative. In reality, as music program is far from continuous in nature, the peak power of the system is much higher – up to ten times the continuous figure. Any limiter, which is to protect the driver from damage, must be able to fulfil the following tasks.

· Have an attack time which is calculated to allow transients through but keep the RMS level below the speaker manufacturers specification;

· Have a release time which is sufficiently long to avoid the limiter itself modulating the program;

· Be intelligent enough to adjust the envelope of the limiter according to the frequency content of the program material.

The program limiters are capable of performing all these tasks. The only parameter that the user must set manually is the threshold, and it is crucial that this is done correctly.

Consider the table below. At 8 ohm impedance these are the threshold values that correspond to the RMS power in the first column (amplifier gain = 32dB):

RMS power	Nominal Impedance (ohm)	Amp Gain (dB)	Threshold (dBu)	Vrms to the load (Volts)
100W	8	32	-0.75	28.28
250W	8	32	3.23	44.72
500W	8	32	6.23	63.24
750W	8	32	8	77.46
1000W	8	32	9.22	89.44
1250W	8	32	10.2	100
1500W	8	32	11	109.54
1750W	8	32	11.67	118.32
2000W	8	32	12.25	126.5
2500W	8	32	13.22	141.42
3000W	8	32	14	154.92

Threshold values for 4ohm system´s impedance:

RMS power	Nominal Impedance (ohm)	Amp Gain (dB)	Threshold (dBu)	Vrms to the load (Volts)
100W	4	32	-3.76	20
250W	4	32	0.23	31.62
500W	4	32	3.23	44.72
750W	4	32	5	54.77
1000W	4	32	6.22	63.24
1250W	4	32	7.2	70.71
1500W	4	32	8	77.46
1750W	4	32	8.67	83.66
2000W	4	32	9.25	89.44
2500W	4	32	10.22	100
3000W	4	32	11	109.54

The tables shown on the previous page are displayed here in graph format:
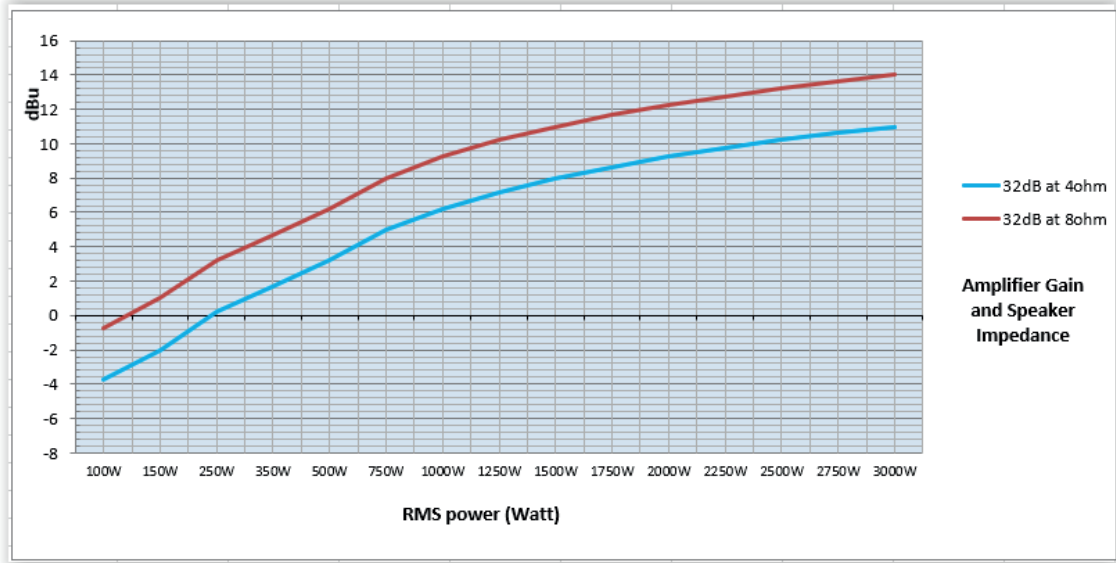
The limiter on each output has an adjustable attack time and threshold, with a release time that is selectable to be a multiplier of the attack time. For example, the attack time is 2ms, then realese time is x16 = 32ms.

The attack and release times can be automatically linked to the high pass filter frequency of the output, so that they are set to correct values for the output´s frequency range. If this feature is enabled, the software will show in orange "Auto":

The attack and release times are set automatically depending on the high pass filter

If the "Auto" option is not engaged these are the recommended attack time values depending on the frequency of the High Pass Filter or the frequency range:

30Hz-60Hz	45ms
32Hz-85Hz	32ms
70Hz-200Hz	5.7ms
125Hz-250Hz	4ms
250Hz-500Hz	2ms
500Hz-1000Hz	1ms
1000Hz-2000Hz	0.5ms
2000Hz-20000Hz	0.3ms

When the "Auto" selection is NOT engaged the user can set as well, the Clip Threshold, which is above the limiter threshold. Typically between 3 to 4dB more with respect to the threshold value.

COMPRESSORS

Compressors are used in professional to compress the dynamic range of a signal - that is - stop the loud parts getting too loud in a bid to prevent sudden unwanted jumps in level. In the iO-48 there is one compressor available per input channel.
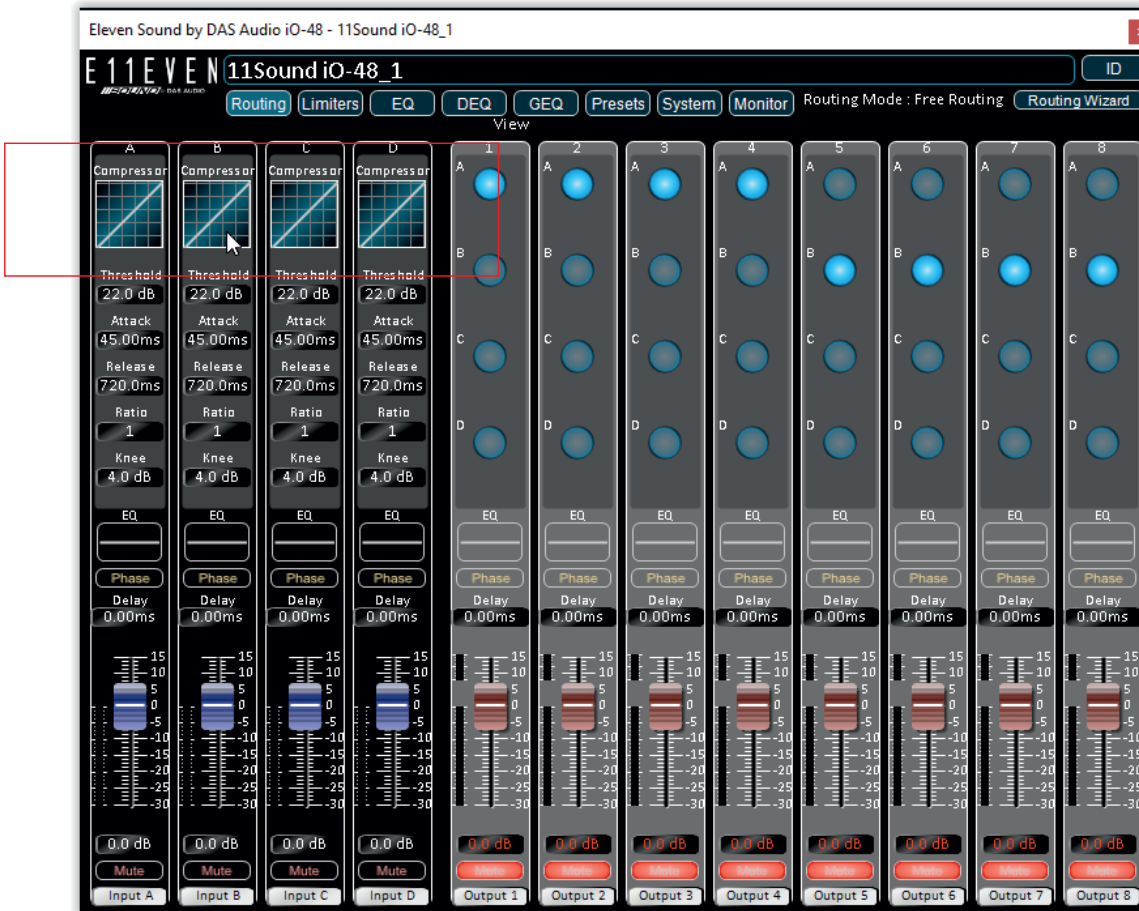

The parameters that need to be adjusted are the threshold, attack and release times, ratio and knee.

One of the most misunderstood parts of a compressor is the parameter usually labelled the 'Knee'. This may be a fully variable control, or a switchable parameter, normally with 'Hard' and 'Soft' settings. The knee control permits a softening of the compressor action, which can prove to be especially useful at high compression ratios.

Without the inclusion of a knee control, at the threshold of gain reduction, a sudden transition occurs between unity gain and the ratio by which the compressor attenuates. When using high compression ratios, the use of a hard knee can result in a very unnatural sound.

Check the difference between the "knee" in channels A&B vs C.

Note: As compressors are affecting all the acoustical chain, these blocks could affect all the outputs. The majority of the times is better to use DEQ for each output.
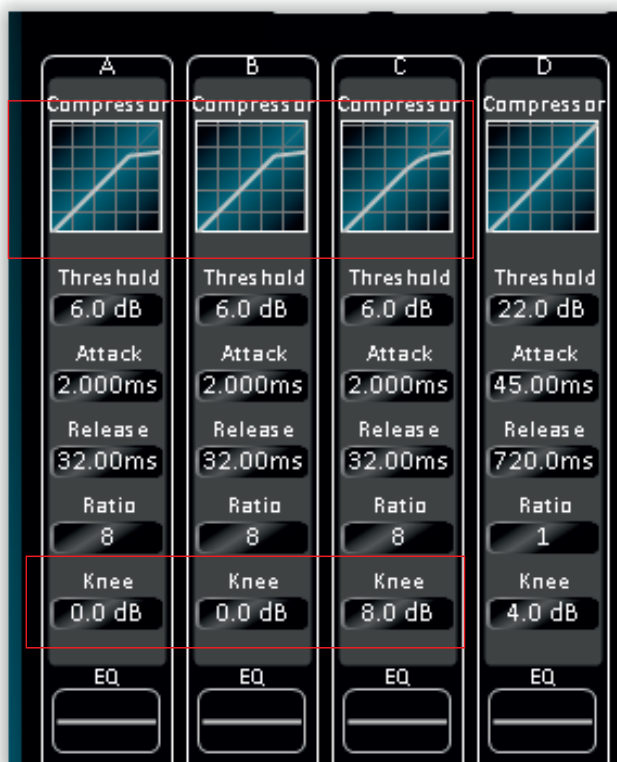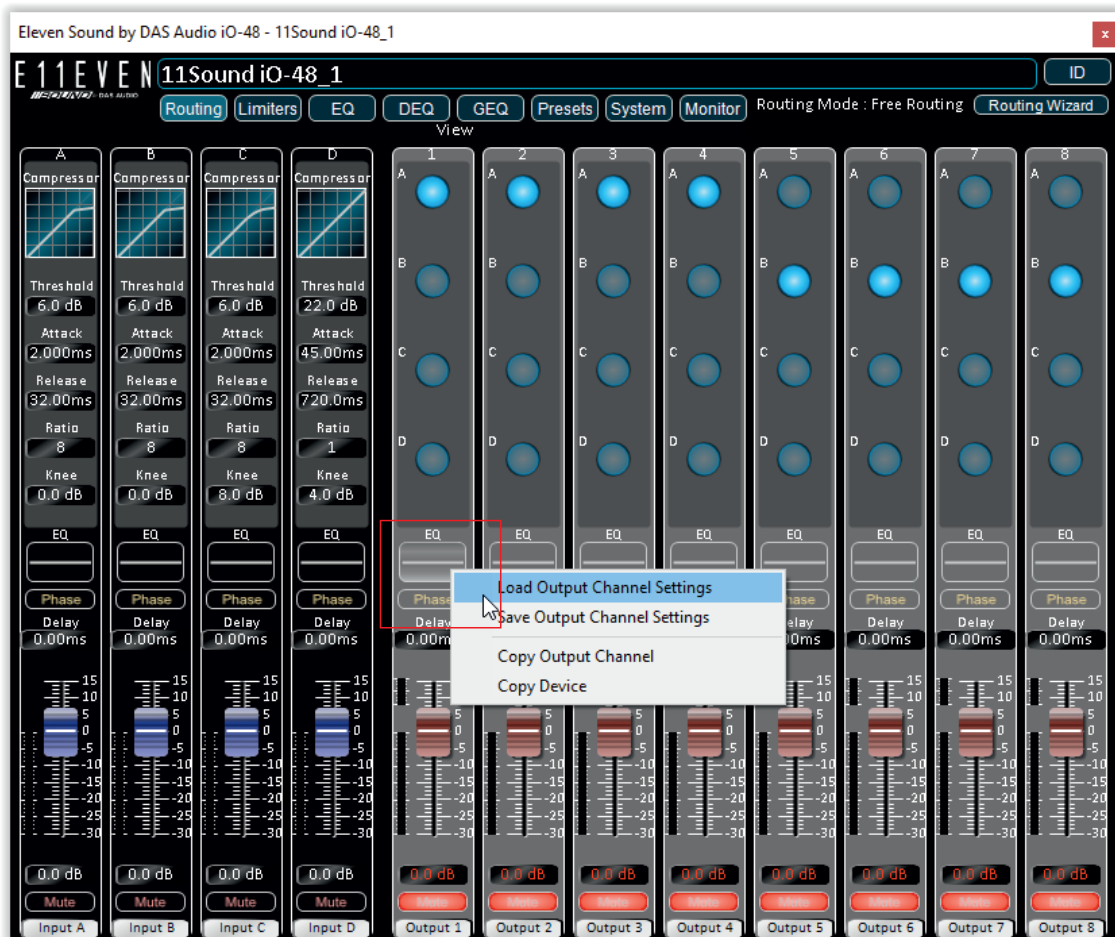
LOAD OUTPUT CHANNEL SETTINGS

The iO-48 allows to load (recall) a preset from the ones that are internally stored in its local bank of memories. By doing this, the user is loading a complete list of settings for all the outputs at the same time.

For instance, when recalling the preset "ES-221+ES-215+ES-112(bi-amped)", outputs 1 and 5 load the parameters of the double 21" systems, outputs 2 and 6 do the same with the double 15" systems, outputs 3 and 6 take the parameters of the Mid range horn of the ES-112, and outputs 4 and 8 take the parameters of the compression driver of the ES-112. this is the standard way of loading preset in a processor.

Let´s say that user is loading a full combination of systems. Each output is dedicated to one of the systems (or way) in that combination.

Besides the above option the iO-48 provides another possibility. It is possible to load in an isolated preset: one preset per output channel in an independent way, not as a complete combination of systems. Each E11EVEN Sound system has its unique file containing the "Output Channel Settings". This option is engaged when right clicking on the EQ small screen located in the "routing" page. Just select the option "Load Output Channel Settings", and select in your PC, the file related to the system (or way) you want to load in the destination channel.

By doing this, the user could have all the desired combinations of E11EVEN products in the 8 processor´s outputs.

On the other way around if the user has created a new output channel settings, these parameters can be Saved in a file in a computer by selecting the option "Save Output Channel Settings".

By right mouse click in the EQ screen also it is possible to copy and paste output channels or entire devices.
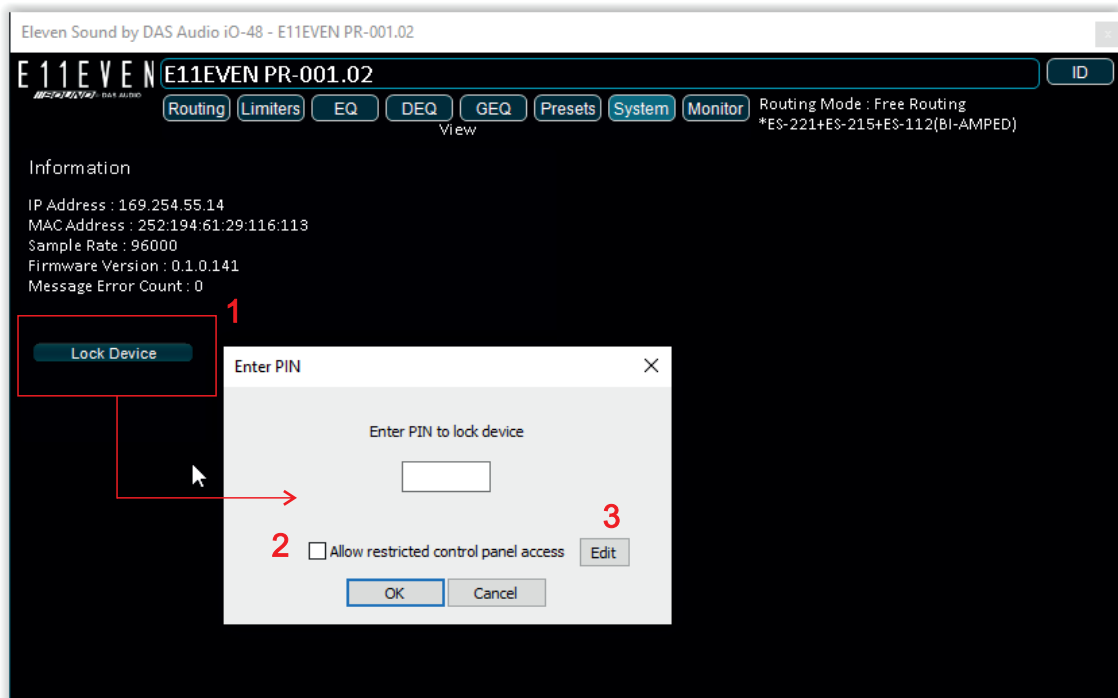
LOCK DEVICE

The iO-48 devices can be locked. this option can be found in the "System" page.

Besides the Locking menu, in this section the user will find all information related to the network and firmware of the unit.


The unit can be locked with a user defined password. Click on the Lock Device button, the following dialog box appears:


When locking the unit, before entering the password, the user has to select the level of security or the parameters that are going to be blocked. Click on the option "Allow restricted control...." and on the "Edit" button.

The following dialog box appears. the user should select which parameters are not going to be accessible. In the sample below, only Input GEQ and Output Gains are not going to be locked.
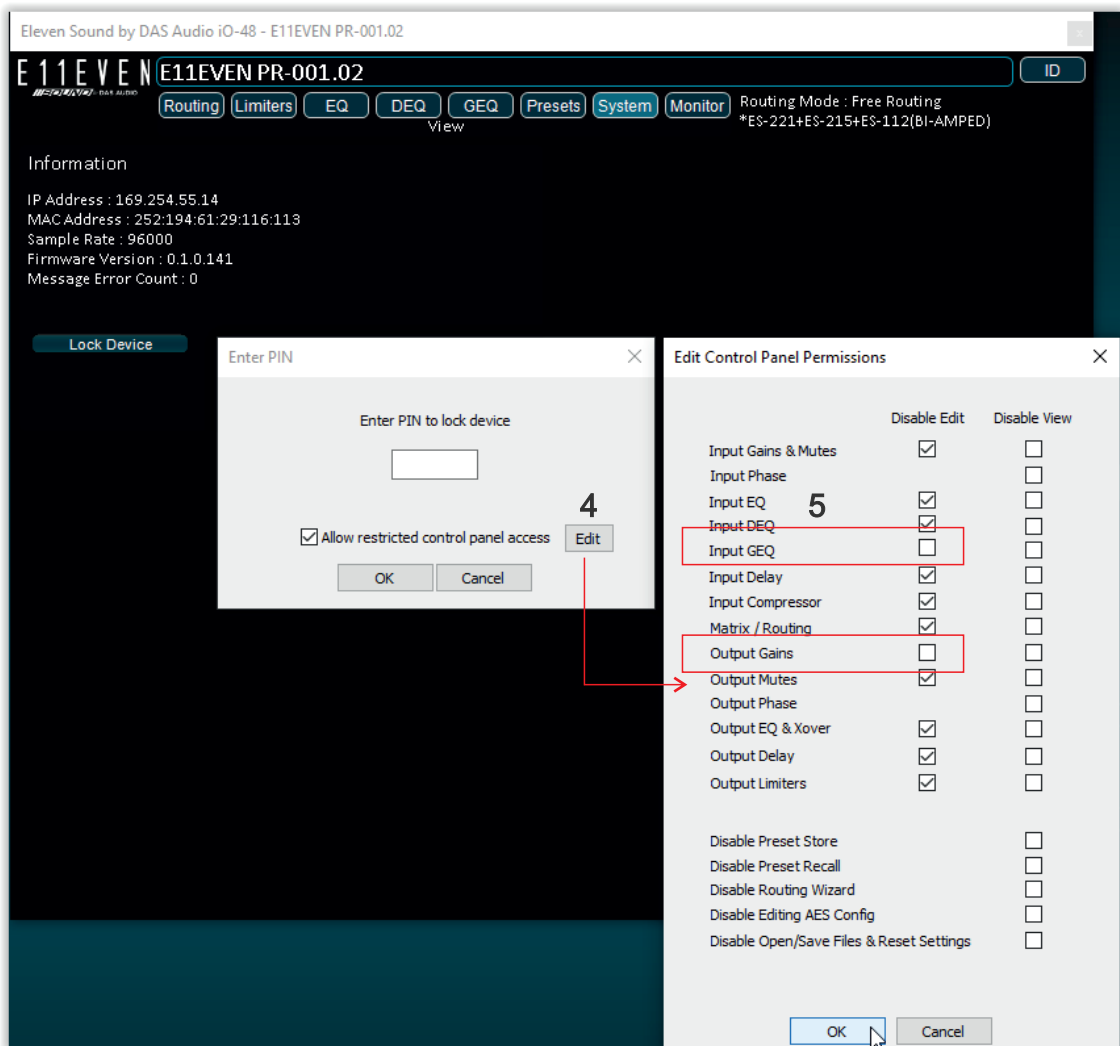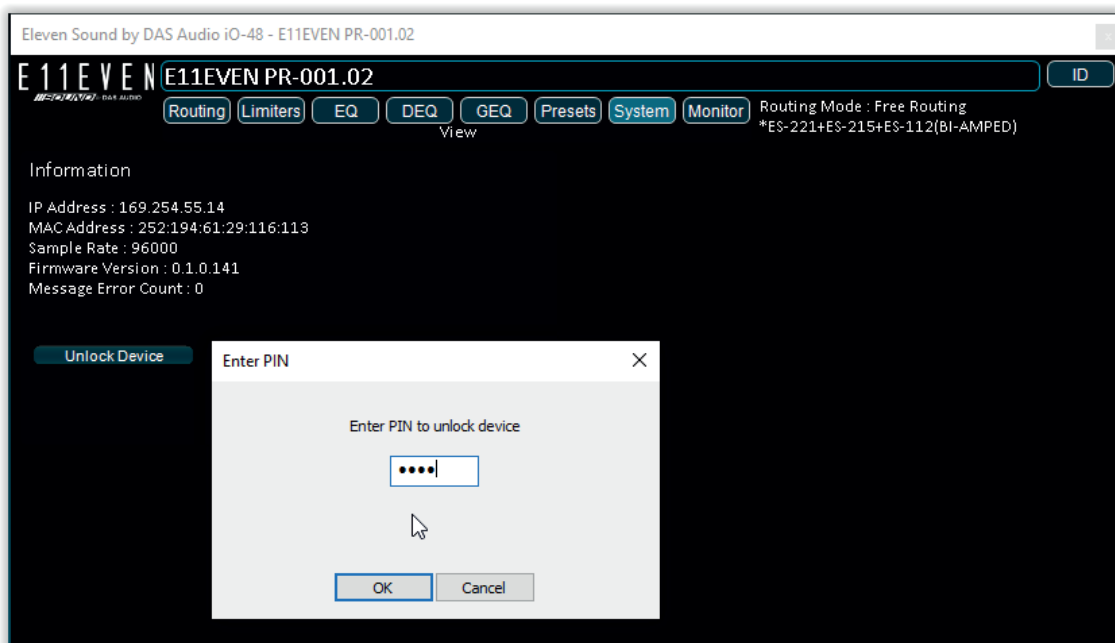

Last step is entering the password/PIN to lock the unit:
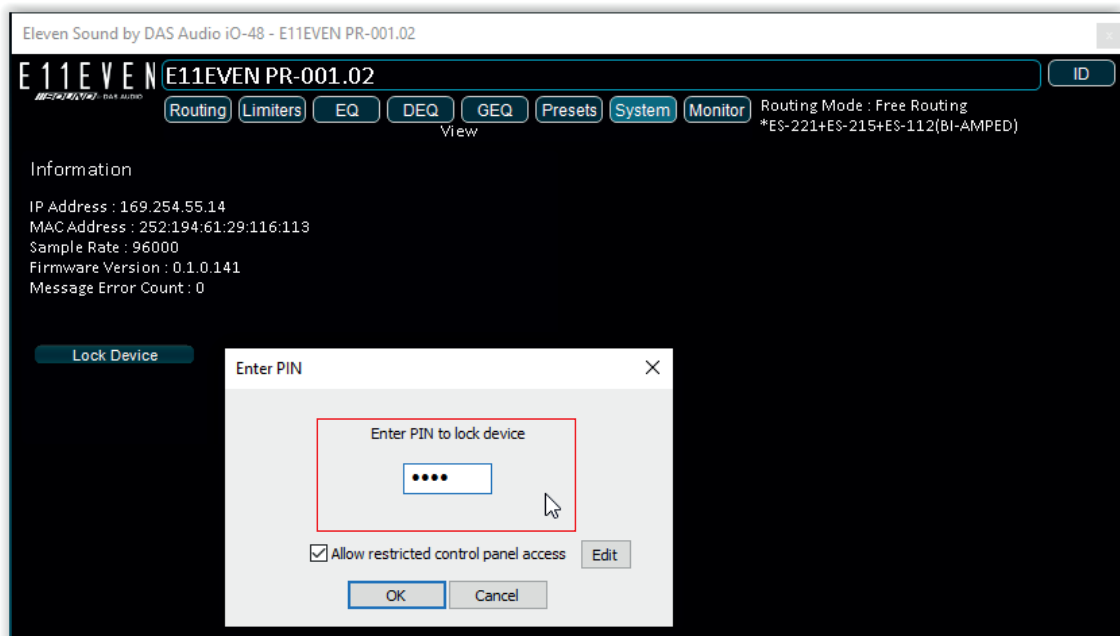
As we have locked the unit, in the "routing" page the only parameters that are accessible now are the Input GEQ and Output Gains (all the rest appears in light grey color, showing that is not possible to modify):
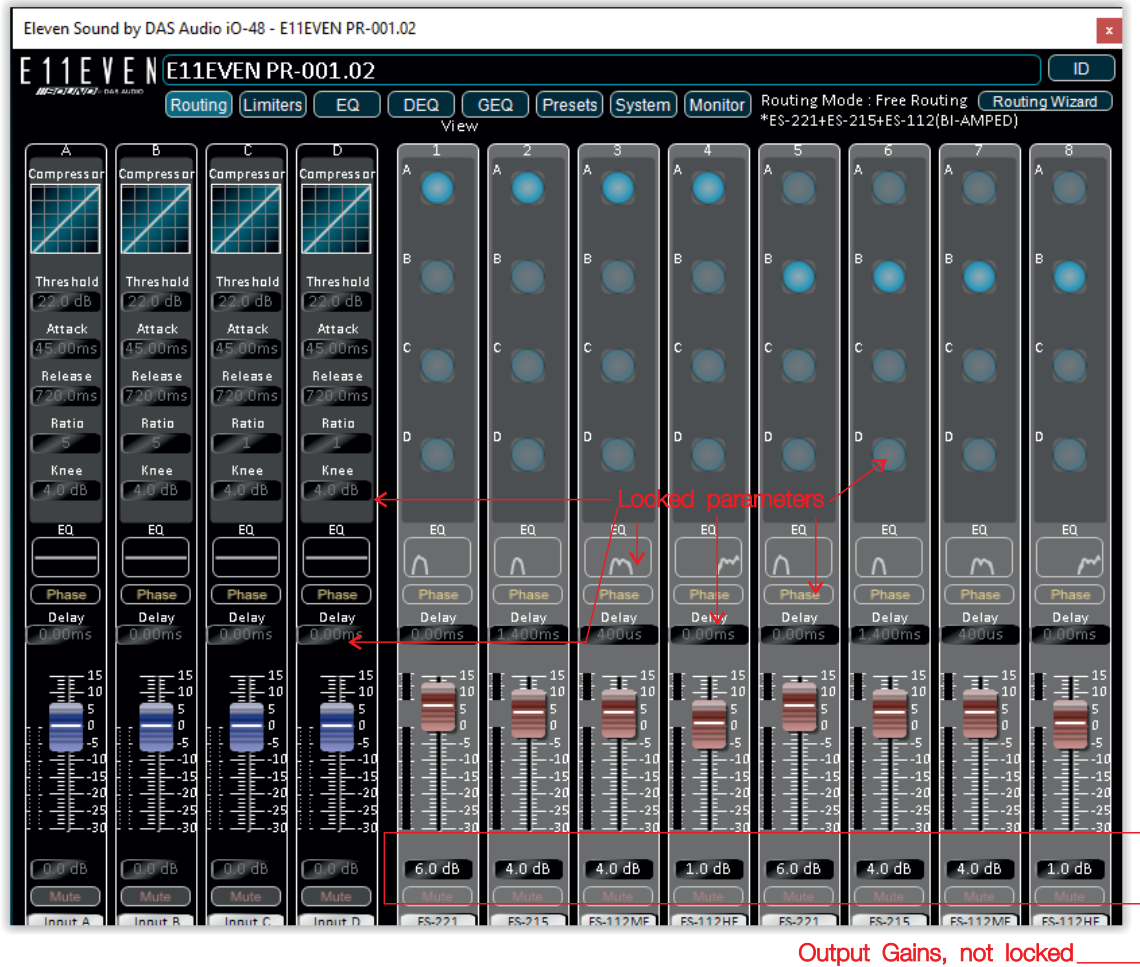
To Unlock the unit, press the button and enter the PIN:

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