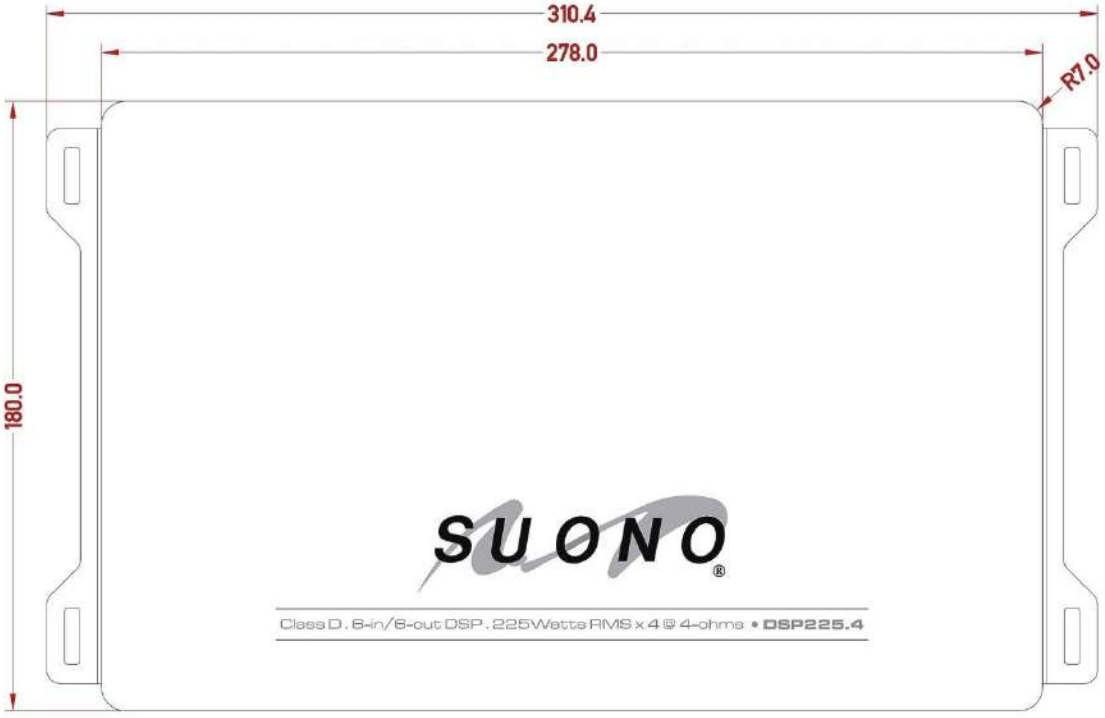
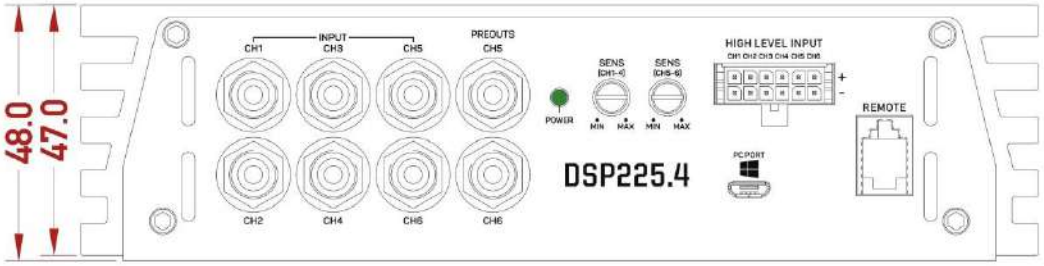
DSP225.4

CLASE D Digital Signal Processor FULL RANGE 4 CHANNEL AMPLIFIER





DSP225.4

CLASE D FULL RANGE AMPLIFIER WITH INTEGRATED DIGITAL SIGNAL PROCESSOR

Congratulations on choosing a SUONO amplifier! At SUONO we are proud of our products and we stand behind them with our name, technical advice, and guarantee. If you have any questions or comments, do not hesitate to contact us, we will gladly assist you. For the installation of your new SUONO equipment, we highly recommend you go to an authorized dealer.
The device you are holding in your hands is a true marvel of modern times. This is a really powerful amp, yet compact. As if this were not enough, it integrates a super modern and complete Digital Signal Processor, capable of taking any equipment to its maximum potential. To make the adjustments it is necessary to connect it to a Windows-based computer, with a screen resolution of at least 1280 x 888 pixels.

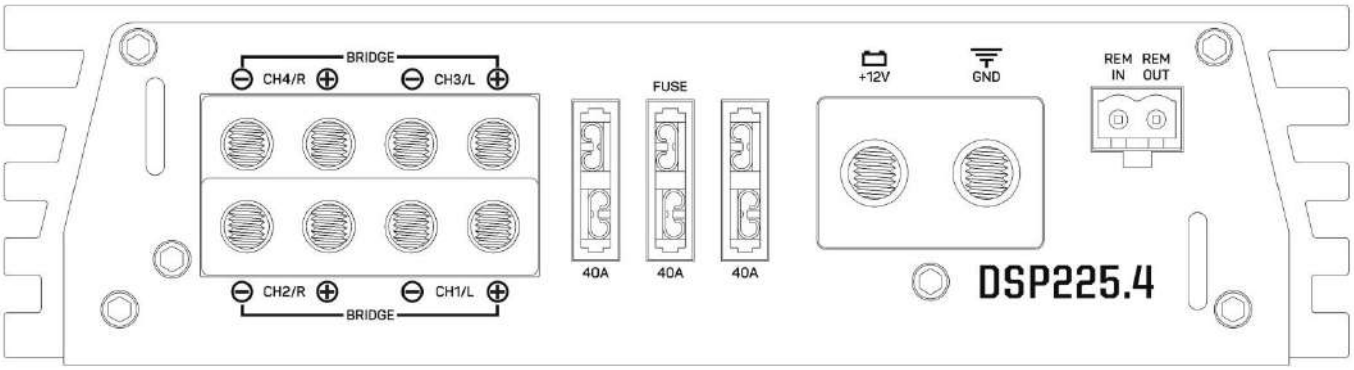
FEATURES

- 225 Watts RMS x 4 @ 4 Ohms; 360 Watts RMS x 4 @ 2 Ohms; 720 Watts RMS x 2 @ 4 Ohms, @ Input Voltage 13.8 Volts.
- Minimum working impedance per channel: 2 ohms. In bridged configuration: 4 ohms. It can work in Double Bridge.
- Low (RCA) and High (speaker level) inputs.
- Automatically turns on when using High Inputs.
- Remote-Out, allows you to automatically turn on a second amplifier.
- 6 fully configurable input channels. This allows speaker-level signals of Original Head Units with built-in electronic filters, to be added to obtain a full-range audio signal.
- Two channels of RCA-level outputs can feed a second amplifier, taking advantage of the integrated DSP. They can take their signal from the main input channels or from two completely independent input channels.
- Three built-in 40 Amp fuses.
- Features of the Digital Signal Processor (DSP):
- The adjustments are made via a Windows-based PC, whose screen has a resolution of at least 1280 x 888 pixels.
- Adjustments happen in real-time.
- 6 input channels that can be configured in any possibility. Adding signals is possible. Signals can come from RCA-level inputs or Speaker-level inputs. **Note: never use signal level and speaker level inputs simultaneously.**
- All possible settings are per channel, that is, each of its six output channels can have different settings.
- It is possible to simultaneously adjust two channels at the same time, either 1 and 2, 3 and 4 and/or 5 and 6.
- To facilitate adjustments, it is possible to temporarily mute channels.
- High-Pass, Low-Pass, and Band-Pass filters per channel. In the case of subwoofers, the application of a Band-Pass filter behaves like a normal Low-Pass, plus a Subsonic (Infrasonic) filter.
- The filters can have three different alignments: Butterworth, Bessel, or Linkwitz-Riley.
- The cutoff frequency (F3) of each filter can be set from 21 to 19,999 Hertz, with a resolution of 1 Hertz.
- The attenuation slope for each filter can be 6, 12, 18, or 24 decibels per octave.
- It is possible to invert the output phase of each channel: 0 and 180 degrees.
- Independent time delays for each channel, adjustable in milliseconds, centimeters or inches.
- 15-Band Parametric Equalizer (Center Frequency, Gain, and Bandwidth (Q) adjustment):
- The center frequency of each band can be set between 20 and 20,000 Hertz, with a resolution of 1 Hertz.
- The Gain range is between -12 to +12 decibels, with a resolution of 0.01 dB.
- The bandwidth or Q factor can be adjusted between 0.3 (wide) to 10 (narrow), with a resolution of 0.01.

To get the most out of your new SUONO amplifier, please study this manual carefully.

This amplifier is capable of large sound acoustic pressure levels inside a car. It is advised to exercise good judgment and protect your hearing. In general, it is recommended to first start the vehicle's engine before operating any audio equipment. Install an in-line fuse in the power cable within 18 inches of the positive battery post. This fuse has the function of protecting you and your vehicle in the event of an accident. The value of this fuse must be equal to or larger than the sum of the amperages of all the devices drawing current from it. The size of the positive current cable to be used is one of the most critical points of the installation and will depend on how long it has to be to reach the amplifier(s), how they are configured, and the number of amplifiers drawing power from it. We recommend the advice of an expert to define it or consult us directly. For reference, in a typical installation with 16 feet of power cable and using this amplifier with all four channels operating at full capacity, the proper power cable would be a pure copper AWG No. 0 wire. To prevent engine noise from entering the system, one side of the car should be designated for the power cable and the other for all other cables, such as RCAs, Remote, Speakers, etc. The type of RCA cable that is most immune to magnetic-induced noise is the twisted one. The ground connection must be made to a point on the chassis close to the amplifier, using the same gauge of cable used for the positive, in star configuration (each device with its own cable, all to the same point). The correct place to take the ground or negative will be a free zone, where the metal sheet has a good caliber or thickness. Once located, it must be drilled and sanded until all traces of paint have disappeared. Then, secure all the grounds using a bolt with a nut and lock washer or star washer; a chipboard screw is not enough or recommended. The ground of the device with the highest power demand should be closer to the metal. Be careful never to fix an amplifier by screwing it directly to the chassis, as this may create a 'double ground', making it easier for engine-induced noise to enter. Always fix them first to some piece of flat wood or equivalent as a base. That flat base panel will also prevent any protrusion from pressing into the back of the amplifier, preventing internal shorts. To avoid overheating, it is important to never install an amplifier upside down, with a loudspeaker box leaning on it, near major sources of heat such as just above where the muffler passes or where it could be hit by the sun, or in any other way in which an adequate air flow through its heatsinks is not guaranteed. If it is not possible to comply with these recommendations or in those cases where the amplifier nevertheless gets into protection mode because of overheating, it will be necessary to install a fan to help keep its temperature within its operating range. The amplifier has several built-in self-acting protection circuits, as well as input fuses.

CONECTIONS. INPUT POWER AND SPEAKER OUTPUTS



This amplifier accepts power wire up to No. 4 AWG, and speaker wire up to No. 8 AWG. The block on the left contains the speaker outputs. Its 4 output channels are marked on it, from 1 to 4. Polarities should be observed. The **BRIDGE** outputs are the upper and lower extreme connectors, that is, to configure channels 1 and 2 in Bridge, the (+) CH1 and (-) CH2 outputs must be used; To configure channels 3 and 4 in Bridge, the (+) CH3 and (-) CH4 outputs must be used. Three 40 Amp fuses are found in the center. When necessary, replace them only with fuses of equal rating. To the right of the fuses is the input power block. The one marked as **+12V** should be connected to the cable that comes directly from the positive terminal of the battery. At its right is the ground terminal (**GND**), which must be connected to the car's chassis, as explained in the previous paragraph. To the far right is the Remotes block, Remote In (**REM IN**), and Remote Out **(REM OUT**). If the signal level audio inputs (RCA) are being used, to turn on the amplifier it will be necessary to connect the Remote output cable coming from your Main Unit here. If the High inputs are being used, the amplifier will turn on automatically as the Head Unit does, and it will not be necessary to connect the REM IN wire. The output marked **REM OUT** outputs a Remote signal whenever the amplifier is turned on, which can be used to turn on a second amplifier.

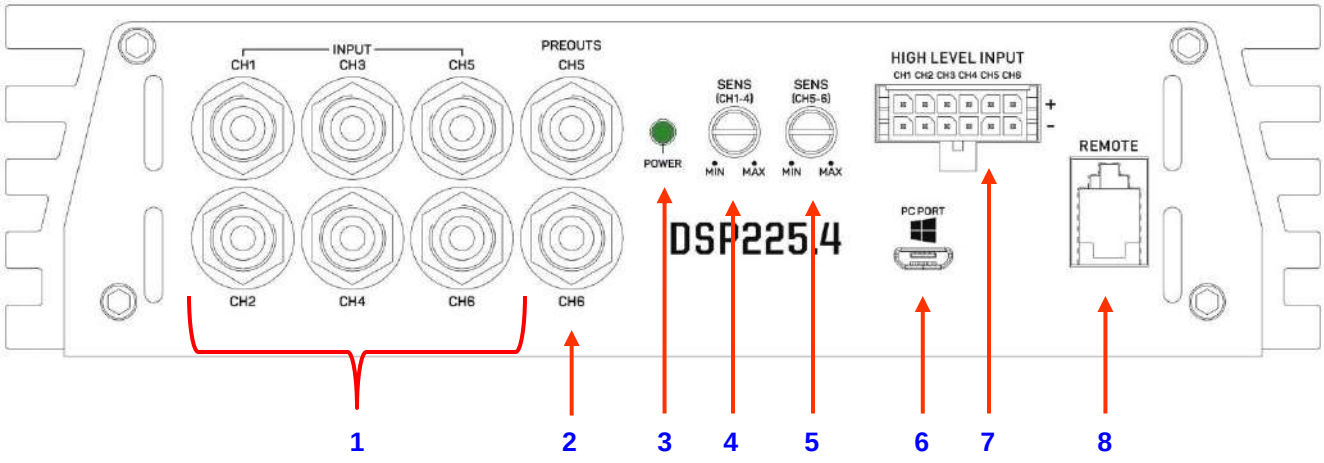
SIGNAL CONNECTIONS AND SETTINGS:

1. RCA inputs for channels 1 to 6 (INPUT). The audio signals are fully configurable in the software. However, the amplifier has two knobs for adjusting the SENS sensitivity or Gain, one for Channels 1 to 4 and the second for Channels 5 and 6.

2. Audio output at signal level (PREOUT). The amplifier has two signal-level audio outputs, which can be used to direct this signal to an external amplifier, taking advantage of all the functions of the integrated Digital Signal Processor (DSP).

3. Status LED. When turning on, the LED lights up red: this corresponds to the self-diagnostic stage. If everything is ok, the led changes to blue and the amplifier starts working normally. In the event that the device goes into self-protection mode, either due to a short circuit, overheating or any other cause, the LED will return to red. If the amplifier turns off after playing (red LED) and it is very hot to the touch, we must ask ourselves the following question: Assuming a device that started operating completely cold (first time turned on today), how long did it take to turn off and get very hot? Less than about four minutes? The problem may be that the impedance of the load is lower than recommended or there is a serious error in the installation. If the device takes 10 minutes or more to turn off (perhaps even a couple of hours), the problem may be that it does not have an adequate heat dissipation, that is, the place or way in which it was installed does not allow it to cool properly. The solution would be to re-install it in a different place or angle, or to install a fan (typically in exhaust configuration) to help keep its temperature within its operating range.

4. Sensitivity or Gain for input channels 1 to 4 (SENS CH 1-4). This knob allows you to match the output voltage or volume of your stereo or device immediately before, with the sensitivity of the amplifier. To adjust, select a piece of music on your stereo with good dynamics, turn this control all the way down, turn the stereo volume up to its full output before distortion (which might be 90% of the volume control's travel), and slowly raise this gain to just before distorted sounds are perceived. Although this technique should provide acceptable results, it is best to go to a SUONO dealer to have it professionally adjusted with the help of measuring instruments such as an oscilloscope.



5. Sensitivity or Gain for input channels 5 and 6. This knob allows you to adjust the sensitivity of Low-Level output channels 5 and 6. It is capable of delivering up to 7 volts RMS before distortion. Because it is a signal prior to an amplifier, it must be handled free of distortion both at its input and output.

6. PC PORT. Insertt the USB-C cable here to connect the amplifier to a compatible computer for access to the control software.

7**. HIGH-LEVEL INPUT.** The included high-level inputs harness should be connected here when necessary. The channel numbering is marked on the chassis of the amplifier, from 1 to 6 from left to the right, with the positive input channels being those on the upper row. The amplifier works the same whether you use High Inputs or Signal Levels(RCA) Inputs. However, **High and Signal Level inputs should never be used simultaneously.**

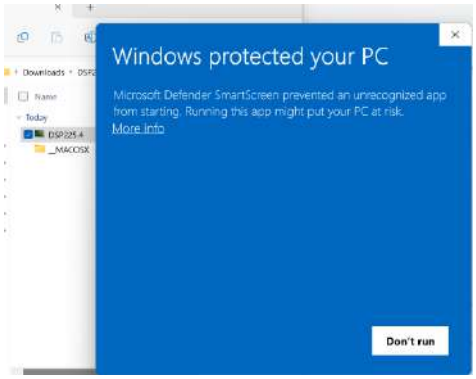
8. REMOTE. This is where the cable for the External Remote Controller should be inserted. This external controller has two functions. The first is as a fader for output channels 3 and 4, typically for adjusting the output level of a subwoofer from the front of the vehicle. Pressing the knob changes its function, allowing you to select between the 6 settings memories previously saved in the device, from Memory A to F.

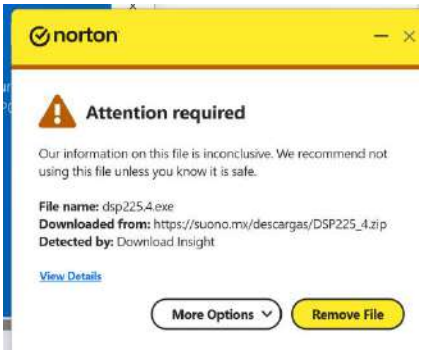
UNLOADING THE SOFTWARE FROM INTERNET

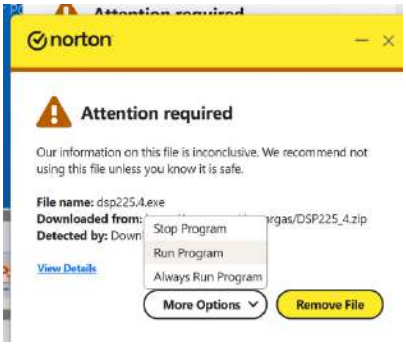
You can download the software from Internet from the following link:

https://suonocaraudio.com/downloads/DSP225_4.zip

Please note that since the file is an executable, the Windows operating system may display certain messages cautioning about potential risks to the computer and suggesting rejection. The following advise screens may appear:
You will need to choose "More info" and then select "Run anyway," select "More Options" and then click on "Run Program."







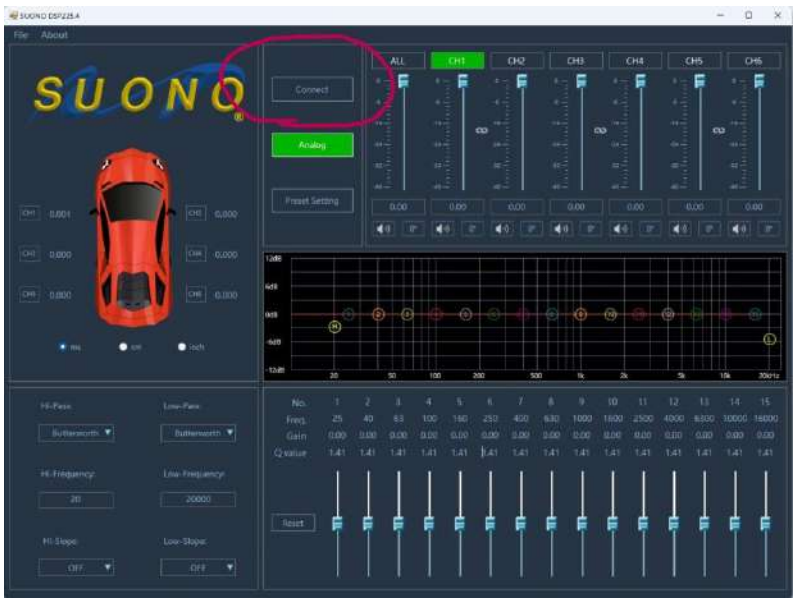
You must insist that you trust the company providing the program and that you do want to download it. After all these steps, you should be able to get the program and it should be ready to run on your computer. Save it to the file of your choice.

DSP ADJUSTMENT

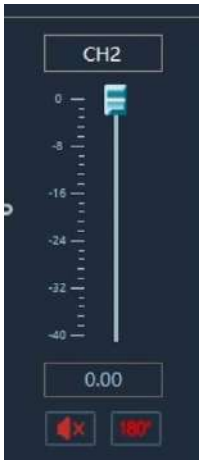
The image below shows the Digital Signal Processor (DSP) control panel that should appear once you have successfully downloaded it. This software works on PC (Windows-based) computers with a screen resolution of at least 1280 x 888 pixels. If your computer has a higher resolution, it may be necessary to go into the DISPLAY SETTINGS and change the SCALE to a smaller size. **Note:** each time you adjust the SCALE it will be necessary to close the program and reload it so that it opens correctly.

ADJUSTING YOUR DSP

1. Step 1. Connect the USB cable from the amplifier to your Windows-based PC and wait a few moments for it to be recognized. Then Click “Connect” (the box to the right of the SUONO logo). Synchronization will take place and the “Connect” box will change to green, signaling that we are now ready to manipulate the settings. Please note that access is only possible when the “Connect” box is green.



The adjustment process of this Digital Signal Processor is very simple. It has four parts, delimited in fact by four rectangles, as can be seen in the image on the left. The first box, where the red vehicle is, corresponds to the Time Delays section. The second, on the upper right, is the Digital Potentiometers section that allows you to individually attenuate each channel, in addition to allowing you to silence them momentarily by clicking on the speaker image (speaker symbol crossed out), or invert its polarity, by clicking on each box to its right The symbol changes from 0° to 180° (see image at right).

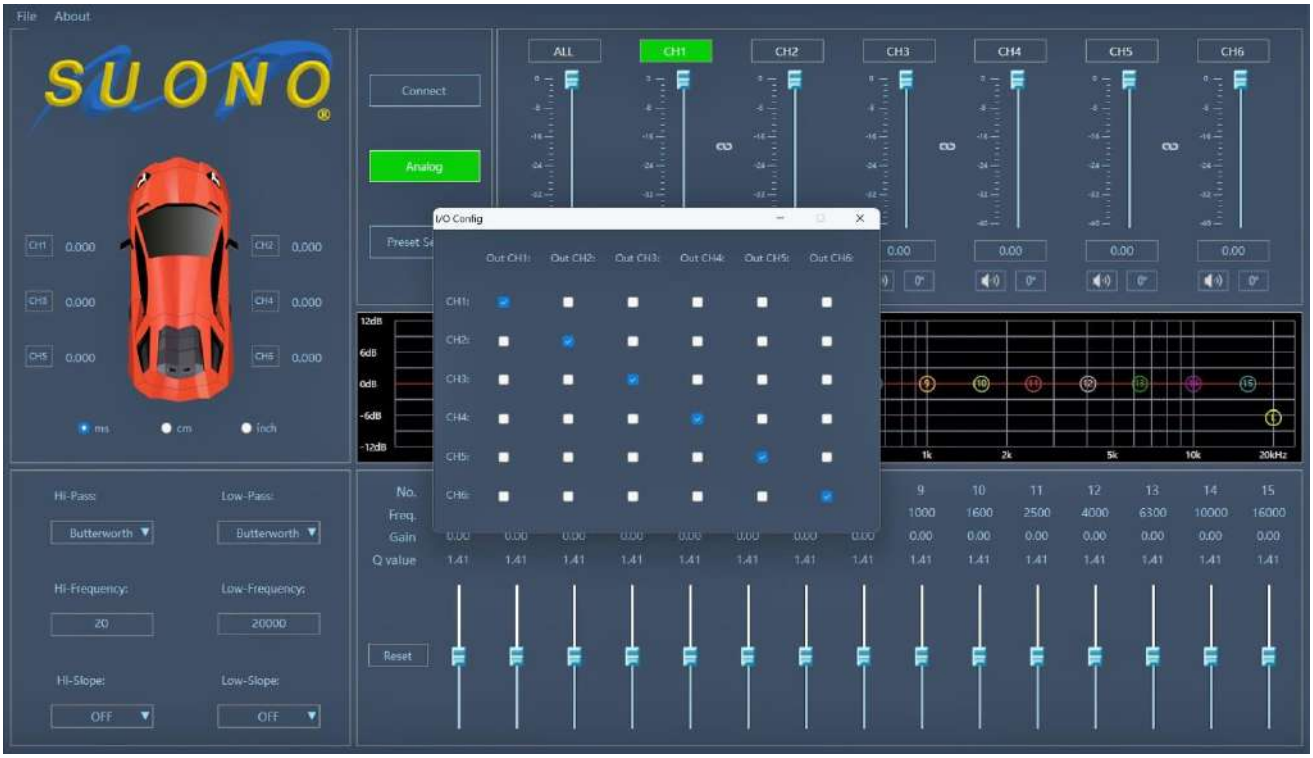


The third box (bottom left) is the one that controls all the filters, while the fourth box represents the equalizer.

Note: This device has six channels and each of them can be adjusted independently. To start any adjustment, **you must first select which channel you want to adjust** by clicking on its name, an action that will change its color to green, as shown in the image above with Channel 1 (CH1). It is also possible to adjust two channels simultaneously, as explained in point 8, “Link Channels”.

2. Step 2 is when you configure the input channels. We need to define what we want to have on each of the six outputs of the amplifier (4 amplified channels and two output channels at signal level), and where we want to take the signal from, for each one of them. In this aspect, this device is outstanding in the sense that it accepts all possibilities and does so with great ease, as can be seen in the following image:

Press **FILE** (upper left corner), then the third option: **I/O Config** (Input / Output Configuration):



As can be seen in the image above, in the **I/O Config** box, the 6 channels outputs are listed horizontally in the top line: Out CH1:, Out CH2:, up to Out CH 6. (Channel 1 output, Channel 2 Output to Channel 6 Output), while the checkboxes below show which input channel they are taking their signal from (they can be RCA Inputs or High Inputs). From the factory it is configured as shown in the image, which shows that output channel 1 (Out CH 1) will take its signal solely and exclusively from Input Channel 1 (CH1), output Channel 2 takes its signal audio only from input Channel 2, and so on.

However, by turning each of the “checkmarks” on and off, we can select where each of the channels will take its audio signal from, **including all possibilities!** For example, it is possible for all channels to take the audio signal exclusively from channel 1, activating all the "checkmarks" in the first horizontal row and deactivating all the others, as is also possible for a channel to take its audio signal from all 6 input channels simultaneously, by checking all the boxes below it vertically. Or any other option.

- For example, if we have a car with front and rear proximity sensors with the ability to chime through the original front and rear speakers, and we intend to install only front speakers, one way to avoid losing the rear chimes is to make the output channel 1 take its audio signal from input channels 1 and 3 (original left front and left rear speakers) while channel 2 takes its audio signal from input channels 2 and 4 (original right front and right rear speakers). Doing so will allow us to keep both front and rear chimes. Assuming these are full-range signals, where the only difference is the location of the chimes, the voltage at the output will double as the channels are being added, so the sensitivity will need to be adjusted accordingly.

- Another possibility is a car that comes with an original tri-amplified equipment, that is, while analyzing the frequency content of the audio signal in the cables that feed the original tweeter, we realize that it is not full range but only treble; analyzing the audio signal that reaches the midrange, it is not full range but lacks treble and bass, and the same in a third set of speakers or woofers, we find that there's only low frequency content. This means that this original equipment has three sets of amplifiers, one for each frequency range, and the crossovers are active, that is, they happen before the amplification, so we do not have a full-range signal available. The way to obtain it to feed our external amplifiers is by adding the three signals, which can be achieved, for example, by activating the checkboxes for channels 1, 3, and 5 for Output channel 1, and the checkboxes for channels 2, 4, and 6 for output channel 2. Note that although we are effectively summing the audio signals, since they are not full-range signals, the output voltage will be the same (it will not increase as it did in the previous example), which will once again be adjusted with the sensitivity knobs on the side of the amp.

By selecting and deselecting each of these "checkboxes" we can configure the channels as necessary, no restrictions.

3. Sensitivity (Gain) Adjustment. Once we've decided where the audio signal for each of the channels will come from, it's time to adjust the Gain Structure via the two Sensitivity knobs on the side of the amp; one handles input channels 1 through 4 and the other input channels 5 and 6. For this, we highly recommend using measurement equipment such as an oscilloscope or equivalent. As a test signal, a track with a pure tone of 1,000 Hertz recorded at 0 dB FS (Full Scale) is typically used: the maximum intensity of the digital format. It is available in many test CDs such as Track 10 of the **Autosound 2000 Test CD # 104**. This track will help us find the maximum possible audio output signal before distortion.

Note 1. It is a good idea to always analyze all the channels that we are planning to use. Measure each individual channel frequency response and output voltage. It is also a good idea to check there are not frequency response changes at different volume levels of an original Head Unit.

Note 2: Remember that adding full-range channels will double the voltage, so you will need to compensate for that with the Sensitivity knob.

Note 3: When adjusting gains, all the Main Unit adjustments such as Balance, Fader, Bass, Treble or any processor, equalizer, or filter, must be off or in its center position, that is, the audio signal should be pure, without any processing. In the same way, all the DSP settings of the SUONO DSP225.4 amplifier must be turned off, such as time delays, filters, equalizer, etc.

The 1000 Hz track is played at 0 dB FS (maximum output before distortion) on the main unit. The waveform is monitored with an oscilloscope or equivalent on each of the output channels that we are planning to use, and its output is adjusted with the Head Unit's volume control so we get its maximum output voltage before distortion. That may or may not be the full range of such volume control. Once that level is achieved, we leave it that way for the rest of the adjustments.

Then we connect the head unit outputs to the DSP225.4 amplifier inputs (high or low) as appropriate, and, for the amplified outputs, we determine the number of decibels of waveform clipping we want to work with, to power our speakers (typically 5 or 10 decibels). Once the amount of clipping decibels has been decided, the adjustment track is changed for another of those same 1000 Hertz, but this time 5 or 10 decibels below FS (Full Scale), with which we will adjust the Sensitivity (gains) of the outputs. With this new sample track of less intensity, the oscilloscope is placed at the power outputs of the channels in question and its sensitivity is adjusted at its maximum output before distortion. All channels are checked. Any voltage difference between channels can be fine-tuned via the processor's 6 output faders (inside the blue circle in the image below).

Note: this does not apply to low-level channels 5 and 6 outputs. As these are pre-amplifier signals, they should be handled at their maximum output before distortion (0 dB FS track).

- These digital attenuators allow 0.01 decibels of resolution.

- Note that since these are faders, the number must be entered as a negative value.

- The leftmost knob, ALL, is the overall fader (yellow arrow). It is typically left on max. The adjustment of this potentiometer is the only one that is not saved in memory. It always stays in the last position it was left in, regardless of whether one of the other curves in memory is chosen.

4. Polarity. The next step is to check polarities and phase, with the help of the little digital buttons under each of the dimmers, the ones shown inside the yellow circle in the image below:

In the yellow circle above, the two possibilities for the polarity of each channel are shown, 0 and 180 degrees. They are very useful for detecting errors in the system. For example, we can start by playing music on the two front channels only (Channels 1 and 2) and reversing the polarity of one of them. When doing so it should sound strange and with a marked loss of low frequencies. If the opposite happens, one of the polarities to our speakers may be reversed or perhaps one of the polarities on the High Inputs is reversed. Same thing for the pair of front speakers versus the rear ones. In the case of two channels operating in BRIDGE configuration, inverting one of the channels should produce almost complete cancellation of the sound.

5. Time Delays. This processor allows you to delay the output time for each channel independently.

Why do we want to delay time? One possibility is to try to achieve a more solid stereophonic sound. The objective of stereophonic sound is the creation of a musical three-dimensionality, that the instruments and singers appear in front of us in the position where they were located when the recording was made: the singer typically at the center of the stage, with the rest of the instruments at his sides, left and right, in different planes. Achieving this effect with two speakers is not an easy task and largely depends on their correct placement. Ideally, they should be positioned at two vertices of an equilateral triangle, with our head at the third. If both speakers are to our left and right, at identical distances from our ears, both their intensity and their sound arrival time will be the same, an essential requirement to achieve the stereophonic effect. The problem lies in the fact that in a car this does not happen, since we are not usually at the center of the vehicle. This being the case, if we are sitting on the steering wheel side, the left speaker will be perceived from our seat louder than the right one as it is closer, and also the sound from it will reach our ears earlier in time for the same reason. But thanks to the digital handling of the signals of this processor, it is possible to delay the output time of the sound in one of the speakers, to compensate for these differences in distances, which has the power to ensure that the sound from both speakers effectively reaches our head simultaneously. This will have the ability to substantially improve the creation of an excellent front-end soundstage and image within the car. Of course, to do so requires that a few other things are also happening, but one of them, the arrival time, is definitely possible to achieve with this setting.

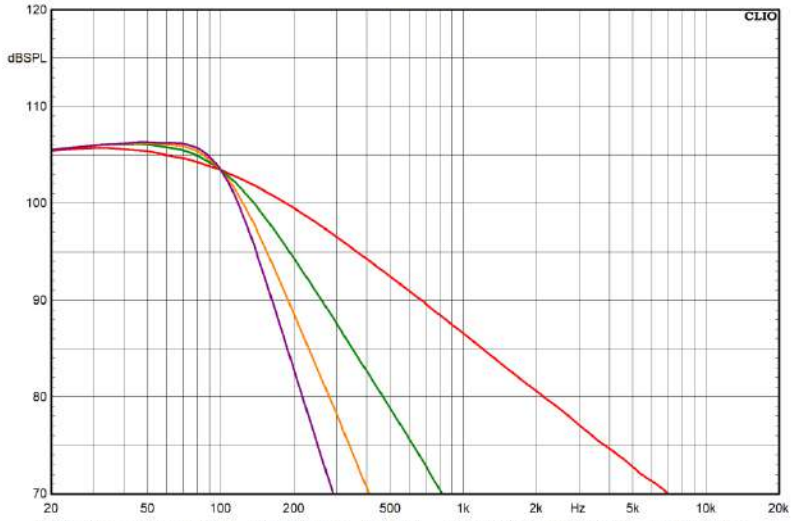
How do we do it? Assuming that the place we are interested in improving is the driver's seat, we first make sure that the seat is in the correct driving position, and with the help of a measuring tape we measure the distance between our left ear and the left tweeter, as well as the distance between our right ear and the right tweeter. Let's assume that such distances are 36 and 45 inches. There is a difference of 9 inches. With this information we select the channel that is feeding our left speaker, suppose channel 1 (within a red circle in the image below), select the Inches (inch) option, click on the number to the right of the box Channel (CH1) and type the number 9.

That's all. If everything else is as it should, this act has the ability to make us feel that the voices come from the center of the vehicle. We could achieve that effect in which sound does not seem to be coming from the speakers themselves but instead we feel like if we were surrounded by instruments, a magical musical experience. Please note that the farther these front speakers are from us, the percentage of error between their distances to our ears will be less, so the necessary time delay will also be less, making it easier for all these effects to take place

6. Crossovers. What follows is to adjust the filters. This processor has High-Pass and Low-Pass filters for each channel. If both are activated, they become a Band-Pass filter. They are controlled through the lower left box controls as well as by dragging the letters “H” (High-Pass) and “L” (Low-Pass) directly on the response curve graph with the mouse. Filters can be of three different alignments or frequency responses: Butterworth, Bessel or Linkwitz-Riley, which can be selected by clicking the first dialog box as shown in the image below. Play with them to see the differences in the graph. The most common is the first, Butterworth, but the most convenient will depend on the characteristics of the installed equipment. 1st order filters (6 dB/octave) can only be Butterworth.

To use the filters we must first activate them, by clicking on any of the two rectangles at the bottom (Hi-Slope and Low-Slope), as shown in the image on the right. When doing so, the four possibilities will appear in terms of their attenuation slope: filters of 6, 12, 18, or up to 24 decibels per octave are available. Each time one of them is selected, the response curve will change in the graph, showing the different amounts of attenuation that they provide. The higher the number, the greater the slope of attenuation.

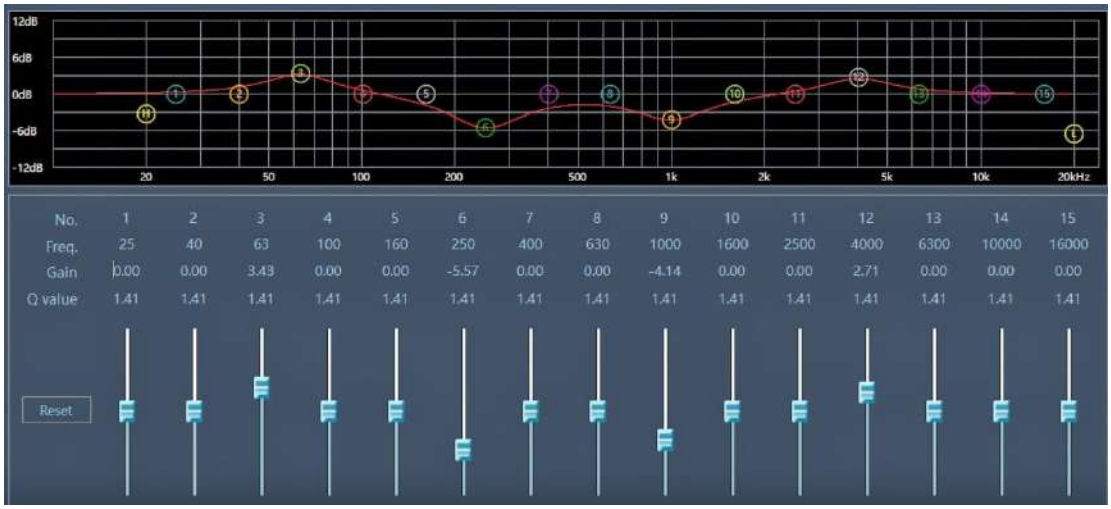
As an example, the graph below shows 4 different responses of four 100 Hertz Low-Pass filters, at 6, 12, 18, and 24 decibels per octave of attenuation.

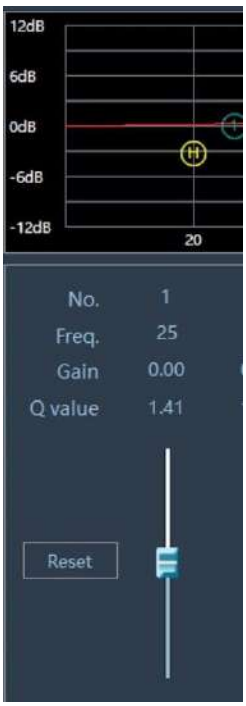


Finally, to change the Cutoff Frequency or F3 Point, simply type it in the dialog box in the center. Any frequency between 21 and 19,999 Hertz is possible. Another way to change the frequency is by placing the mouse over the letters “H” for High-Pass or “L” for Low-Pass directly on the graph (or your finger if the computer screen is a “touch screen”) and simply scrolling through them until achieving the desired frequency. **Note**: “H” must always be less than “L”, even if either is off.

Important Note: When using a pair of channels in BRIDGE mode, the filters on both channels must be identical or cancellations will occur. In fact, a good practice would be to always Link any pair of channels operating in Bridge mode (see Step 8).

7. Equalization. The last step is equalization. We shouldn't start equalizing until the equipment is already sounding extremely good. EQ should be subtle, preferably using attenuations, removing what is harsh rather than over-boosting frequencies. It is the “icing on the cake”, it is that small but significant difference that will lead the system to its optimal performance. This device has six equalizers, one for each channel, each with 15 fully parametric bands, that is, it is possible to select the center frequency, the bandwidth, and the amount of decibels of adjustment for each of them. Much more that enough.





In the image on the left we have one of the equalization bands, Number 1, with the Central Frequency setting at 25 Hertz (Freq. 25). If we put the Mouse over the number 25, it is possible to write any other integer between 20 and 20,000 Hertz, which will represent our new Central Frequency Adjustment.

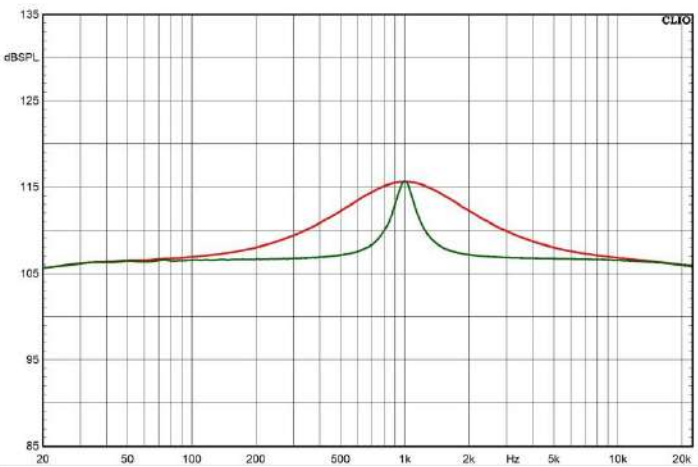
Below we have Gain, that is, the amount of decibels of amplification or attenuation that each band will have, between +12 and -12 decibels, which can be adjusted by placing the Mouse on each virtual potentiometer and moving it up or down, placing the Mouse on the Number of the band on the graph and moving it, or by clicking on the number and typing any positive or negative value within this range, with two decimal places of precision.

The third adjustment per band is the Q value or bandwidth. This is a dimensionless value that determines how many frequencies are involved when attenuating or boosting each band. It is defined as Central Frequency divided by Bandwidth at -3dB. The default value, 1.41 for each band, is a good starting value as it allows independence between adjacent bands if the factory center frequencies are also preserved. However, under specific circumstances, it is very valuable to be able to modify them. In the graph below two curves are shown as an example, both with a gain of 9 dB @ 1,000 Hertz: the Red one has a Q of 0.5 while the Green one has a Q of 3.

Clicking on the number “Q value” it is possible to type any value between 0.3 and 10, with a resolution of 2 decimal places.

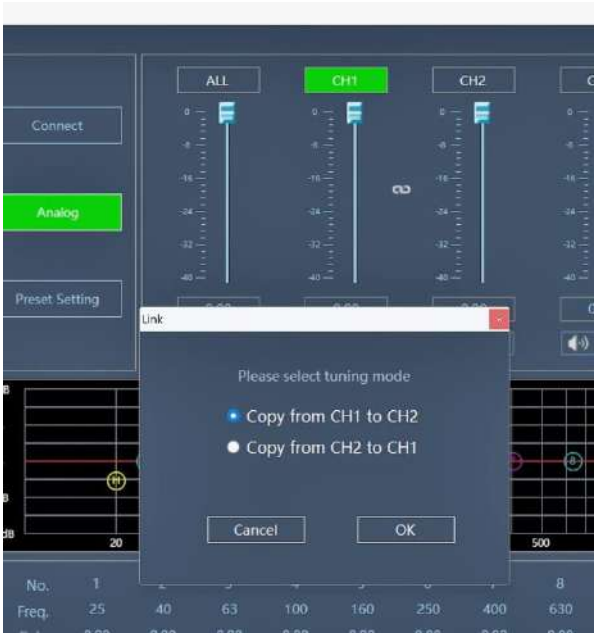
- If we choose the option to adjust our equalizer by placing the mouse over any of the 15 numbers that appear on the graph (one per band), it is possible to simultaneously adjust both the Central Frequency setting and the Gain in decibels.

The **Reset** button allows you to zero the equalizer, returns it to all factory settings.



8. Link Channels. Another very useful feature of this device is its ability to link channels. On those occasions in which we require to have the same equalization curve and filters in a pair of channels, for example both front o rear channels, it is valuable to activate the Link function. By activating this function, everything that is done in one of them will be repeated in the second, which will greatly speed up the adjustment process. This function is activated by clicking on the "string" signs, which are shown enclosed in a red circle in the image below:

Once pressed, the window shown on the right will appear:



In this window, we are asked if we want to copy what is on Channel 1 to Channel 2, or vice versa. In this way, all settings that have already been made to a channel so far, if any, are not lost.

The Linking rules are as follows:

- Only two channels can be linked at a time: 1 and 2, 3 and 4, and/or 5 and 6.
- Once Linked, the chain symbol turns green.
- Channel Linking only affects two things: Equalizer settings and Filters.
- You can deactivate the Link at any time. Once deactivated the channels remain as they were, but from that moment on, it is possible to make independent adjustments for each channel.

Important Note: When using a pair of channels in Bridge mode, the filters on both channels must be identical or cancellations will occur. In fact, it is a very good practice to always Link any pair of channels operating in Bridge mode.

Note 2: In the same way, when using two channels in bridge mode, there must be no time delays on those two channels, or the delay must be the same, otherwise cancellations will occur.

9. Memories. The DSP225.4 amplifier has several non-volatile memory possibilities. The first option is the 6 memories integrated into the device, which can be accessed by clicking on the Preset Setting option (yellow arrow below):

Pressing "**Preset Settings**" will bring up the dialog shown on the previous page, which offers two options:

Save to device: (Save to the memory of this device)

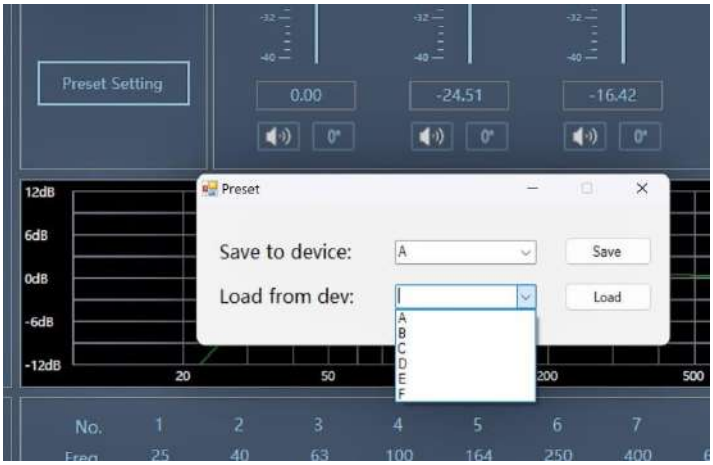
Load from dev: (Load from the memory of this device).

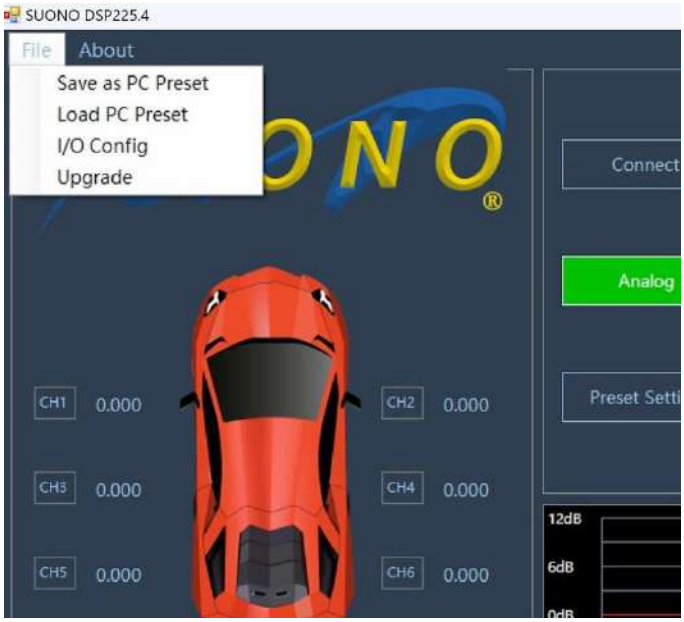
Within any of the two previous options, pressing the down arrow at the end of the dialog box displays the 6 memory positions integrated into the device, from A to F.

To save or store in memory the settings present at any moment, drop down the "**Save to device**" option, select a letter between A and F, and then press the button on the far right marked **Save**.

To load saved settings from any of the six memory locations, pull down the "**Load from dev**" option, select a letter from A to F, and then press the button to its far-right marked **Load**.

Note: It is possible to instantly recall each of these six memory settings while driving, with the help of the External Remote Controller.





In addition to the six memory locations built into the device, it is also possible to store many other memories in our computer.

Simply press **File** located in the upper left corner, which will bring up the dialog box shown in the left image.

Here you can select **Save as PC Preset**, where you can save it into your computer into any file you choose.

To load presets stored in your computer, Click **Load PC Preset** which will display a window where you can browse and download any previously saved preset file.

Note 1: When loading Presets stored in your computer's memory, the process may take 20 seconds or more. This is completely normal.

Note 2: Memories can store:

- Time Delays
- Attenuation levels per channel
- Filters
- Equalization curves.

So preset memories save everything except the General Level Attenuation (**ALL**, digital potentiometer to the extreme left).

10. External Remote Controller. This DSP amplifier is equipped with a dual-function External Remote Controller. Its main function is as a Fader for output channels 3 and 4, typically for allowing you to adjust the output level of a subwoofer from the front of the vehicle. It only works as an attenuator, that is, from the gain that has been set for channels 3 and 4, downwards.

Pressing the knob changes its function, and now it will allow you to select between the 6 Memory settings previously saved in the device, from Memory A to F.

Note 1: Since it is a Digital Attenuator, the attenuation that has been selected will remain in effect, even if the controller's cable has been disconnected from the amplifier.

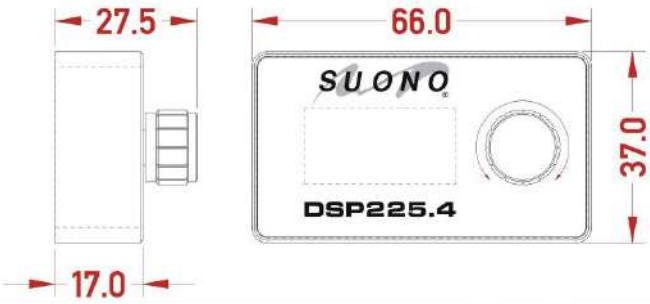
Note 2: To switch between the Controller's two functions, press the knob.

Note 3: Turn the knob slowly. Turning it violently does not speed up its operation. The opposite may be true.

Note 4: The lighted display of this controller is always on.

Note 5: While the DSP225.4 is connected to the computer through the USB cable, the External Remote Controller stops working.

Dimensions in mm.



SPECIFICATIONS

6 input channels, 4 amplified output channels + 2 signal level channels.

225 Watts RMS x 4 @ 4ohms; 360 Watts RMS x 4 @ 2 ohms: 720 Watts RMS x 2 @ 4 ohms.

Minimum working impedance per channel: 2 ohms. In bridge mode: 4 ohms.

Automatic turn-on with high inputs. Creates a Remote output to power a second amplifier.

Channel Routing: it is possible to send the audio signal from any input channel(s) to any output channel(s). All options are possible.

Maximum output voltage at its RCA signal outputs on channels 5 and 6, before distortion: 7 V RMS.

Input voltage range at signal level (RCA): 0.35 to 8 Volts RMS.

High Inputs capable of accepting up to 28 Volts RMS (200 watts).

Input impedance at RCA signal level > 30,000 ohms.

Output impedance at RCA signal level < 40 ohms.

All settings in Real Time.

15-band Parametric Equalizer per channel.

High-Pass, Low-Pass and Band-Pass filters per channel with the option to select the attenuation slopes of 1st, 2nd, 3rd or 4th order (6, 12, 18 or 24 decibels per octave). Three different alignments for the filters: Butterworth, Bessel and Linkwitz-Riley

Phase shift per channel between 0 and 180^{o}.

Function to silence (MUTE) each channel individually or all together.

Time delay per channel up to 5.5 ms (187 cm or 73.6”).

Operating voltage: 9.5 – 16 V.

WARRANTY:

SUONO products are guaranteed for one year for the original retail purchaser against defects in material and workmanship. Products found to be defective will be repaired or replaced (at SUONO’s discretion) at no charge. Damage caused by misuse, abuse, product modification, accidents, improper installation, water, and unauthorized repair attempts is not covered. Cosmetic or finish damages are not covered. Products not purchased in the United States from an authorized dealer are not covered. Incidental or subsequent damages to other products are not covered. Any costs or expenses for removing and/or reinstalling the product are not covered. SUONO’s total liability will not exceed the purchase price of the product. Some states do not allow limitations on implied warranties so this may not apply to you. You are responsible for the shipment of your product to SUONO. Please get in touch with SUONO first to get a Return Authorization Number.

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