

USER MANUAL

INSTALLATION, WIRING AND SETUP MANUAL
CAR PROCESSOR AMPLIFIERS

RESOLUT X12-DSP
RESOLUT X8-DSP



(version 1.0)

Congratulations on your purchase
Resolut processor amplifier!

Our mission is to offer a product with uncompromising sound quality and a wide range of customization options. We are confident that you can experience the full value and enjoyment of our processor amplifier while using it.

Before installing and setting up your processor amplifier, please read this manual carefully. It will help you to quickly and easily connect the processor and understand the variety of its settings.

The producer reserves the right to make changes in the product and software without further notice for the purpose of their future development and improvement of consumer qualities.

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GENERAL RECOMMENDATIONS

SAFETY PRECAUTIONS

- 1.** The processor amplifier is designed to be installed in vehicles with a 12 Volt DC power system with the negative pole grounded to the vehicle body. Connection to a power supply with other characteristics (e.g., 24 volts or positive pole to the vehicle body) may cause it to be damaged.
- 2.** Select the correct location for installing the device. Do not install it in the engine compartment or other locations where it may be exposed to high humidity, excessive heat, dust and dirt. Make sure that the chosen location does not affect the operation of the vehicle's mechanical and electrical components. The air around the unit should circulate freely to dissipate excessive heat from the device.
- 3.** To simplify installation, plan your audio system configuration in advance and select the best cable routing method. Use high quality cables, connectors and accessories. Select the correct cross-section of the power cables. We recommend using wires of at least 8.3 sq. mm, provided that a fuse of no more than 50A is installed on the line to protect the cabling. The best cross-section is 25 sq. mm.
- 4.** Take care when routing the cables for the processor amplifier. They must be securely fixed along their entire length and must not come into contact with moving parts, sharp edges or heated components. Provide the cables with adequate mechanical protection along their entire length. Use special braids, bushings, etc. for this purpose. Do not route cables outside the vehicle.
- 5.** Disconnect the power supply to the audio system before installation and, where this is not possible, provide suitable short-circuit protection during installation work. Accidental short circuits can cause damage not only to the processor amplifier and other components of the audio system, but also to the on-board electronics.
- 6.** Follow the safety instructions when working with tools. If necessary, use protective glasses and gloves. Ensure that the brake and fuel system lines and other important components are not damaged during work.
- 7.** Take special care to ensure that the processor amplifier is securely fixed. Poor fixing may cause damage to the amplifier during operation, as well as damage to cables, audio system components or on-board electronics, and may even cause serious damage to vehicle occupants and other vehicles.

PROCESSOR AMPLIFIER CONNECTION

A view of the processor amplifier is shown in the following figures (connector side view):



1. LO LEVEL Processor amplifier signal inputs for connecting low level analog signal sources.

2. HI LEVEL Processor amplifier signal inputs for connecting high-level analog signal sources.

3. 13 14 15 16 Processor amplifier signal outputs for connecting additional amplifiers.

4. Outputs. Power outputs of the processor amplifier for connecting speakers.

Note. Use + - of the same channel number to connect the loudspeaker. It is strictly forbidden to use different + and - numbers when connecting the speaker - it will damage the speaker. Only channels 11 and 12 can be used to connect 2 ohm speakers. Channels 1-10 must be used in conjunction with loudspeakers with impedance of 4 ohms and higher.

5. REM

IN – input for controlling the switching on of the processor amplifier.

The processor turns on when a control voltage of 12 Volts is applied (minimum trigger voltage is 5 volts).

OUT – output for controlling the switching on of external amplifiers (+12 V, allowable current up to 100 mA).

6. Power. Connector for connecting processor amplifier power cables:

+ – the plus power wire of the processor amplifier.

- – minus power supply wire of the processor amplifier (ground).

Note. Use wires with different color markings for connection. Use the black wire to connect to the vehicle ground or to the minus terminal of the battery. and - on the power connector of the device. Use the red wire to connect to the plus terminal of the battery and + on the power connector of the unit. Incorrect connection may damage the unit and vehicle systems.

Note. Normal long-term operation of the processor amplifier is ensured at a supply voltage of 10 to 16 Volts. Short-term supply voltage sags (not more than 2-3 seconds) up to 6 Volts are allowed.

7. SRC. Terminal for connecting the optional wired processor control panel and other optional control devices (volume control potentiometer, preset selector, etc.).

8. USB. Terminal for connection to the processor of a computer or laptop for control with **Resolut DSP Tool_XDSP** software.

9. Optical. Terminal for connecting an SPDIF digital signal source with optical output (Toslink format). Stereo digital streaming is supported. Playback of multi-channel signal (Dolby Digital, DTS) is not supported.

10. Coaxial. Terminal for connecting an SPDIF digital signal source with coaxial output. Stereo digital streaming is supported. Playback of multi-channel signal (Dolby Digital, DTS) is not supported.

11. LO Processor amplifier signal inputs for connecting low level analog signal sources.

PROCESSOR AMPLIFIER TUNING PRINCIPLE

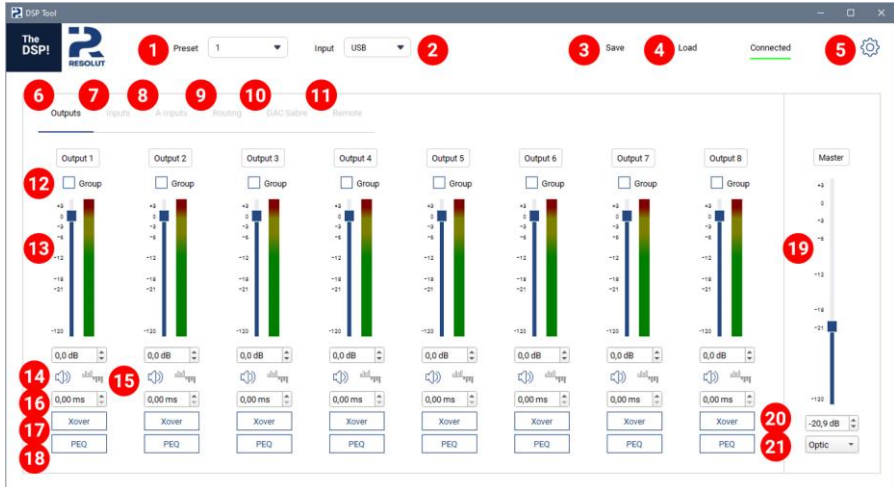
To configure the processor amplifier use a computer or laptop **with Resolut DSP Tool XDSP** software installed. The latest version of the software is available for download on the official website **resolut.ru**.

After installation, connect the processor amplifier to the USB port of your computer or laptop and run the program. You can also run the program without connecting to the processor amplifier to get acquainted with its features.

Tip: You can use the option to run the program offline (without connecting to the processor) to create the audio system configuration in advance. Save the created configuration to a file on your computer and then load it with the processor connected.

OPERATION OF THE PROCESSOR AMPLIFIER TUNING PROGRAM

When you start the **Resolut DSP Tool XDSP** program, the main window looks as follows:



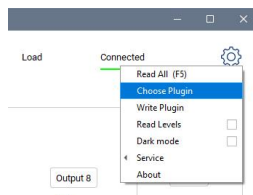
1. Preset. Preset Selection. Up to four preset configurations can be stored in the processor amplifier's memory.

2. Source. Selects the source from which the processor is receiving the signal at the current time.

3. Save. You can save your current processor amplifier configuration to a file on your computer so that you can return to it later, or use it to configure another similar processor amplifier.

4. Load. You can load a previously saved configuration from a file on your computer into the processor.

5. Debugging and upgrading the processor amplifier. The following actions are available:

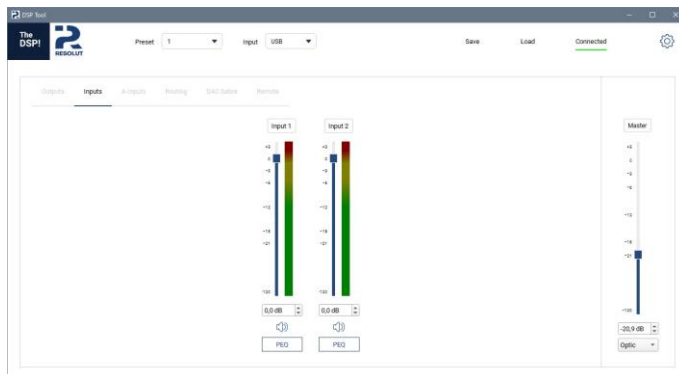


- **Read All** – reading the current settings from the processor amplifier. If you suspect that the connection between the processor and computer has been temporarily disrupted (e.g. by accidentally touching the USB connector, etc.), it is possible to read the current settings of the processor amplifier in order to resume their correct display in the control program.
- **Write Plugin** – updating the subroutine (firmware) of the processor amplifier in "manual" mode. In contrast to the previous item, you are prompted to select the subroutine file corresponding to the updated configuration of the processor amplifier. This update procedure is described in detail in the corresponding section of this manual.
- **Read Levels** – real-time monitoring of signal levels at inputs and outputs.
- **Dark Mode** – you can change the color scheme of the control program and settings as desired. For example, depending on the characteristics of your monitor or lighting conditions, a "dark" theme may be easier to perceive.
- **Service** – A menu of service functions that are not used during operation but may be required during debugging of the processor amplifier. For example, rebooting the processor amplifier.

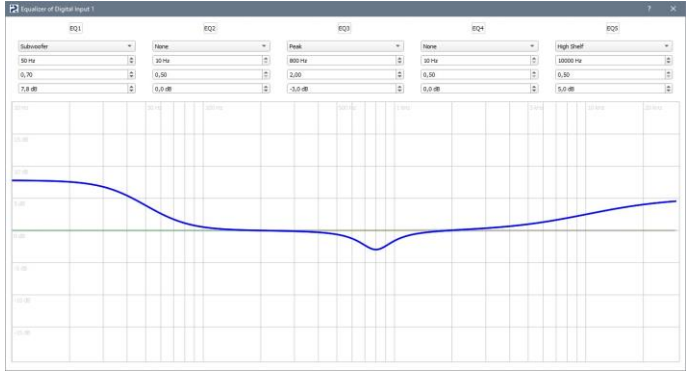
***Tip:** The Read Levels function consumes a small amount of processing power from the processor amplifier, so it is disabled by default. However, monitoring the signal at the inputs and outputs can be useful when configuring the processor amplifier. You can enable it when you are configuring the processor amplifier, and disable it when you are finished.*

6. Outputs. The control program contains several tabs-windows grouped by functional purpose. At startup the program opens the first of these tabs, where you can configure the output channels. This is the main tab of the program. If you are in another tab, clicking on Outputs will return you to the main window.

7. Inputs. When clicked, the program displays the input channel adjustments window of the digital inputs. Use the sliders to make quick adjustments or specify exact values for the signal levels.



Note, the PEQ buttons in the Inputs tab bring up the Parametric EQ adjustment window to correct the input signals. You can adjust the AFC individually for each input channel.

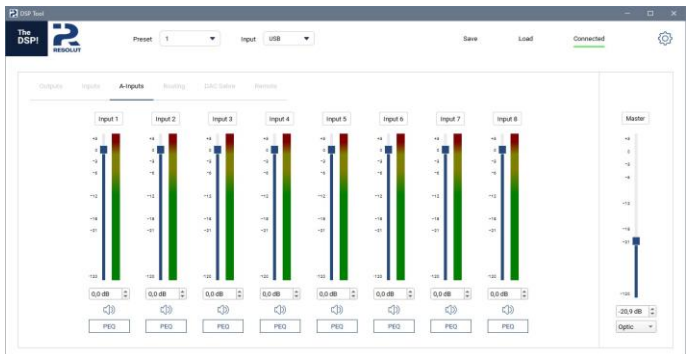


A choice of equalization type is available in each of the control bands:

- **Low Shelf** и **High Shelf** – AFC correction by "step".
- **Peak** – traditional equalization in a narrow frequency band.
- **All Pass 180** и **All Pass 360** – phase (all-pass) filters.
- **Low Pass 12dB** и **High Pass 12dB** – additional low-pass and high-pass filters.
- **Subwoofer** – setting the AFC correction for bass level adjustment using the optional Resolut SRC remote control when Parametric mode is selected. The operation of such correction will be discussed in the corresponding section of this manual.

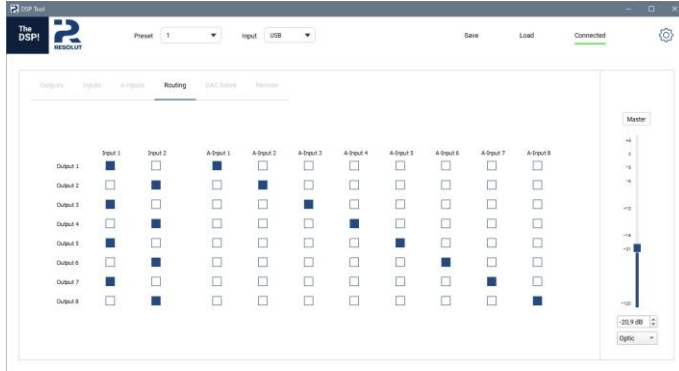
Tip: To reduce the CPU computational load, use only the required number of bands. For the remaining bands, leave the equalization type selection window set to None.

8. A-Inputs. When you click, the program displays the analog input channels adjustment window. Use the sliders to make quick adjustments or specify exact values for the signal levels.



The PEQ buttons in the A-Inputs tab bring up the Parametric EQ adjustment window for correcting input signals. You can adjust the AFC individually for each input channel in the same way as you do for digital inputs.

9. Routing. When you click on it, the program displays the signal routing window. Here you can specify from which inputs to which outputs the signal will flow. The appearance and content of this window depends on the type of installed modules.



10. Advanced settings for the processor amplifier. In this tab the program displays the settings window of the digital-to-analog converter of the processor amplifier. The appearance and content of this tab depends on the type of DAC used in a particular model of the processor amplifier. This part is described in detail in the corresponding section of this manual.

11. Remote. The tab displays a window for selecting the type and setting of the wired remote control. The specific settings of this tab are discussed in the corresponding section of this manual.

12. Group. For ease of adjustment, you can group multiple output channels together for synchronized adjustment of signal levels and delays. Note that equalization and filters are in any case adjusted individually for each channel.

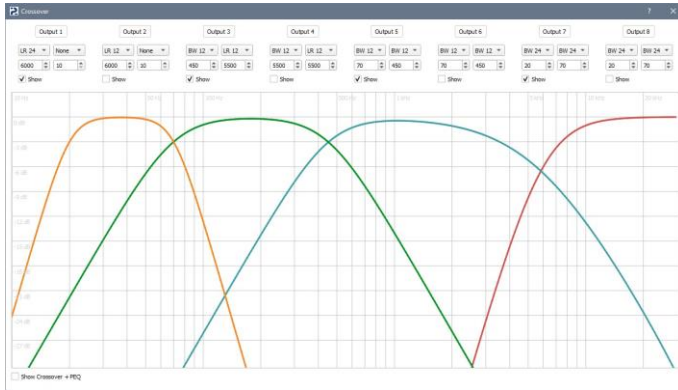
13. Adjust the levels of the signals in the output channels. Use the sliders for quick adjustments or specify precise level values.

14. Mute. Mutes signals in individual output channels.

15. Polarity. Changing the polarity of signals in output channels.

16. Delay. Setting signal delays in output channels.

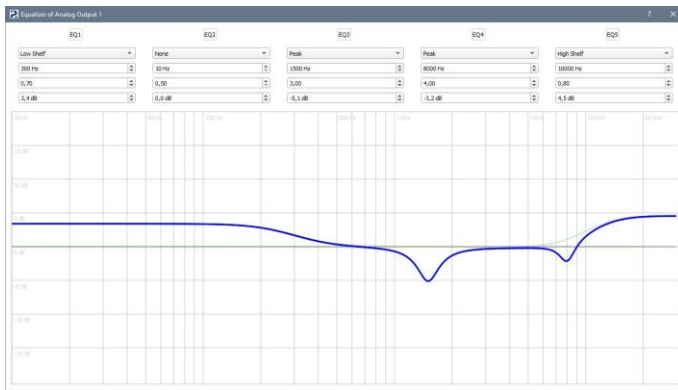
17. X-Over. When you press it, the program goes to the filter adjustment window. For each output channel upper and lower frequency filters are available with possibility to choose steepness and filter type. The graph shows the AFC of the selected channels.



Tip: For visual control of the result we have provided an opportunity to estimate the resulting AFC in the channels taking into account equalizer operation. To do this, click Show Crossover+EQ at the bottom of the window.

18. PEQ. When you click on it, the program goes to the equalizer setting window. You can adjust the AFC individually for each output channel with the five-band parametric equalizer. In each of the adjustment bands are available:

- **Low Shelf и High Shelf** – AFC correction by "step",
- **Peak** – traditional equalization in a narrow frequency band,
- **All Pass 180 и All Pass 360** – phase (all-pass) filters,
- **Low Pass 12dB и High Pass 12dB** – additional low-pass and high-pass filters



Tip: To reduce the CPU computational load, use only the required number of bands. For the remaining bands, leave the equalization type selection window set to None.

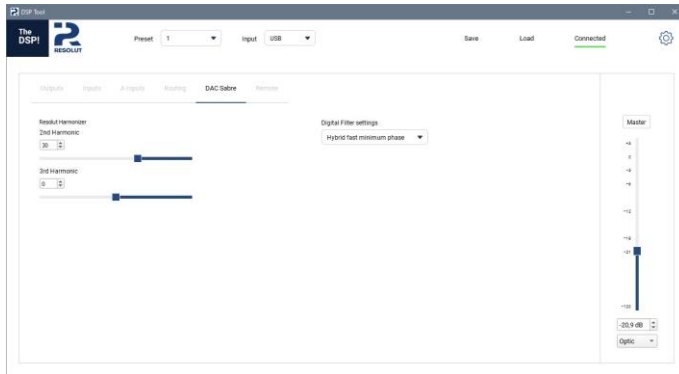
20. Master. While setting up the processor amplifier, you can quickly adjust the overall volume of your audio system (master volume). Use the slider for quick adjustment or specify the exact value of the signal level.

21. Selecting the digital input type. When selecting a Digital source, the processor can work with either an optical or coaxial input.

ADVANCED SOFTWARE FEATURES

We are pleased to offer you more features than most car processors on the market. In addition to the basic settings, Resolut processor amplifiers feature digital-to-analog converter mode control.

When connected to the processor, an additional DAC tab appears in the control window. Its content depends on the model of the processor amplifier, the figure below is presented as an example:



Harmonic character adjustment in accordance with the original Resolut Harmonizer technology. Using the potential of digital-to-analog converters together with the original algorithms of audio signal processing developed by us, it is possible to fine-tune the character of the sound. Adjusting the levels of second and third harmonics allows you to make the sound more "soft" and "warm" or more "sharp", emphasizing the high speed of attack. In a sense, the adjustments provided are an alternative to physically replacing the operational amplifiers at the DAC output.

Please note that due to special phase transformations of the signal, the level of harmonics can be adjusted not only in "plus", but also in "minus". Therefore, it is possible not only to give the desired sound character to the processor itself, but also to compensate to a certain extent for the peculiarities of other components of the audio path, achieving the most correct and comfortable sound of the entire audio system as a whole.

Select the mode of operation of the digital filter at the output of the digital-to-analog converter. The principle of operation of any DAC is to decode a binary digital sequence (a stream of "zeros" and "ones") and restore a continuous analog signal at the output. In the course of this conversion, first the samples - a sequence of pulses following with a certain frequency and having a variable amplitude - are recovered. Then it passes through a filter that cuts off the high-frequency component of the signal, and at the output we get a continuous analog signal.

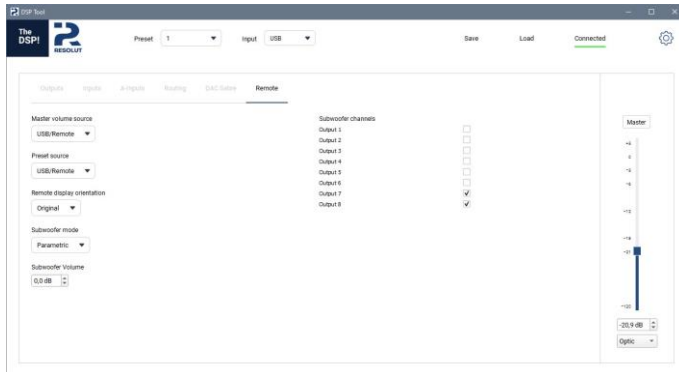
As a rule, developers of digital-to-analog converters implement several types of such filters in their chips, which differ in their characteristics and parameters. The type of

the chosen filter greatly affects the character of sound - it can be more "spacious" or more "collected", more "dry" or more "musical". However, not all manufacturers of audio equipment (and car processors in particular) use this potential, usually favoring only one type of filter.

Our mission is to provide you with maximum and uncompromising possibilities of system customization, that's why in Resolut processor amplifiers we have implemented a choice of output filter modes. The software allows you to quickly change the type of digital filter while the processor amplifier is running and select the one that provides the most comfortable sound in your audio system.

CUSTOMIZATION OPTIONS FOR THE OPTIONAL RESOLUT SRC REMOTE CONTROL

When you connect the optional Resolut SRC remote control to the processor, you can customize its functionality in the Remote tab.

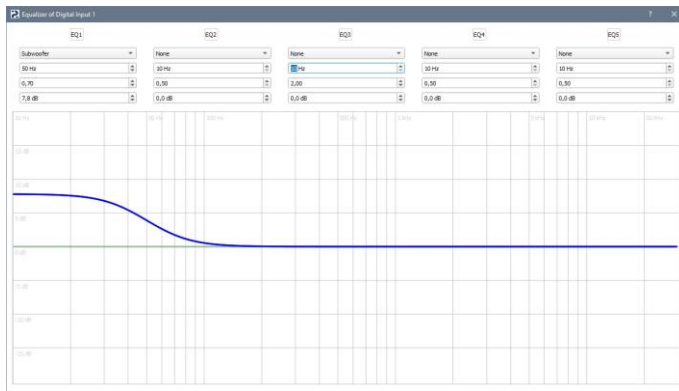


- **Master volume source** – choosing the volume control means (optional Resolut SRC remote control, potentiometer connected to the Control connector or control from the standard source connected via MOST interface).
- **Preset source** – choosing of a means for switching presets (optional Resolut SRC remote control or a switch connected to the Control connector)
- **Remote display orientation** – Choose the orientation of the image on the screen of the optional Resolut SRC remote control. Allows the remote control to be installed in two versions - with right or left encoder positioning.
- **Subwoofer mode** – the choice of bass level adjustment method. Classic means normal subwoofer level adjustment relative to the other channels, while Parametric means adjusting the bass level in all input channels according to a predetermined AFC. The features of these modes are discussed below.
- **Subwoofer volume** – signal level in the subwoofer channel (in Classic mode) or woofer gain level according to the set AFC (in Parametric mode).
- **Subwoofer channels** – Select channels to adjust the subwoofer level in Classic mode.

Subwoofer mode Classic – is the traditional way of adjusting the bass. It consists of correcting the signal level in the subwoofer channels relative to the other channels. The main disadvantage of this method is that band coherence is compromised by significant level adjustments.

Subwoofer mode Parametric eliminates the problem of the traditional way of adjusting the bass level. This mode does not correct the signal level of individual subwoofer channels, but corrects the bass response of all output channels. Compared to the traditional method, this does not disturb the band matching and allows you to maintain the overall sound character of the bass range.

To set the bass level control AFC limit in Parametric mode, go to the Inputs or A-Inputs tab and click the PEQ button in the corresponding input channel. In the window that opens, select the Subwoofer equalization type and set the desired AFC correction curve by specifying the frequency, quality factor and maximum gain.



Now you can adjust the bass level via the connected optional Resolut SRC remote control (or set it in the control and setup program under the Remote tab). The signal will be adjusted according to the set characteristic.

VOLUME CONTROL METHOD WITHOUT THE USE OF A PDA RESOLUT SRC

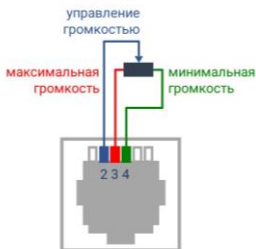
If it is necessary to control the overall volume in the system using the processor amplifier's facilities (e.g. if the source does not have volume control), we strongly recommend using the optional Resolut SRC wired remote control. In addition to volume control, it allows you to switch sources and presets, adjust the bass level of the system (subwoofer level or via parametric adjustment), and provides some other features.

However, in some cases, when the additional functions of the remote control are not needed and it is required only to adjust the volume, you can do it in a simplified way - using a potentiometer of 10-22 kOhm. For example, you can use any suitable wired subwoofer level control that some amplifiers come with.



To connect to the Resolut processor, use a flat "telephone" cable with at least three cores, terminated with an RJ11 connector. For reliable operation of the remote control, try to choose a quality cable with copper conductors. Do not choose a cable with Copper Clad Aluminum (CCA) conductors.

Attention! Before connecting it is necessary to check the pinout of the connector for compliance with the connection diagram to the Resolut processor. In case of mismatch it is necessary to re-solder the wires in the remote control!



max. volume volume control min. volume

SUBPROGRAM UPDATE (FIRMWARE) OF THE PROCESSOR AMPLIFIER

The processor has the ability to update the subroutine (firmware) when its configuration changes. For example, when adding or removing modules. This is done in the following sequence.

Step 1: Launch the **Resolut DSP Tool XDSP** software. Before updating the subroutine (firmware), be sure to save the processor amplifier settings. To do this, click the Save button and specify a file name and a location on your computer where the file will be saved.

Step 2: There are two ways to update a subroutine. Click on the Debug and Update Processor Amplifier icon (gear symbol).



- **When installing optional plug-ins**, we recommend that you upgrade via the Choose plugin item. In the menu that opens, select the desired item and run it by clicking OK.
- **If you have an update (firmware) file**, select Write plugin. In the opened file menu select the prepared file and press "Open".

Step 3. The update procedure will start automatically. If the program does not respond for more than 30 seconds, repeat the procedure. After successful flashing, the Plugin write successfully message will be displayed.

Step 4: After the processor amplifier is rebooted, a new program will be loaded into the amplifier and all settings will be reset to zero. To prevent damage to connected amplifiers and loudspeakers, the volume level will be set to -70 dB when the amplifier is first turned on.

Step 5: To return the processor amplifier settings, click Load and select the file to which they were saved in the first step.

Note. The device has a working firmware version installed. It is not recommended to constantly update the firmware when the device is working properly.

TECHNICAL PARAMETERS AND CHARACTERISTICS OF RESOLUT X12-DSP

Configurations and connection possibilities:

- Number of amplifier outputs: **12**
- Number of analog outputs: **4**
- Number of digital inputs: **2**
- Number of analog inputs: **12**
- Maximum power of the built-in amplifier 160W per channel(4 Ω).. 240W per channel(2 Ω).For 2 Ω only 11-12 channels can be used

Digital Processing:

- Center Chip: **Analog Devices ADAU1452**
- Signal-to-noise ratio, digital input: **130 dB**

Digital-to-analog conversion:

- Digital-to-analog conversion: **2xES9080Q Sabre, 32 bit**
- Frequency range of analog outputs: **2 Hz – 65 kHz**
- Dynamic range of DAC: **120 dB**

Analog-to-digital conversion:

- ADC chip, resolution: **3xES9840 Sabre, 32 bit**
- ADC signal-to-noise ratio: **115 dB**

Size and weight:

- Size: **307x 200 x 64 mm**
- Weight: **3,5 kg**

GUARANTEE TERMS

Resolut products are subject to warranty service only in the country of original sale and by authorized Resolut distributors. The official distributor has the right to refuse warranty service for a product purchased in another country and delivered to the consumer on a One Way Delivery Without Return basis.

Resolut products in the Russian Federation are warranted in accordance with the current Russian Federation Law. The warranty is valid for one year from the date of sale, confirmed by a sales receipt. Resolut warrants the product to be free of design and manufacturing defects at the time of first purchase by the end user. The delivery set is checked at the moment of receipt of the goods and confirmed by the signatures of the Buyer and the Seller, post-sale claims on the delivery set are not accepted.

The guarantee is not valid in the following cases:

- The product serial number and sales receipt are missing or falsified.
- The product has external and/or internal traces of mechanical and other damage caused by foreign objects, particles, substances, liquids, etc.
- The product shows signs of damage caused by natural phenomena, natural disasters, fire, etc.
- Non-observance of the product's operating norms, exceeding the operating parameters, careless handling, incorrect connection, etc.
- The product has been tampered with or repaired by unauthorized persons or service centers.
- The product has been defective due to installation by a non-certified installation center.

The distributor assumes no obligation to transport the product. Resolut and the Resolut distributor are not responsible for costs and expenses caused by the inability to use this product.

Product

Serial number

Seller Company

Buyer

Date of Sale

