

**PROFESSIONAL
FOUR CHANNEL
SWITCHING POWER AMPLIFIER
DF-series with DSP**

DF1404 DSP

DF1408 DSP

DF2008 DSP

DF2804 DSP

Owner's Manual

ACCESSORIES

- | | |
|-------------------|-------|
| 1. Power Cord | 1 pc. |
| 2. Owner's Manual | 1 pc. |
| 3. Warranty | 1 pc. |



AVIS
RISQUE DE CHOC ELECTRIQUE
NE PAS OUVRIR

CAUTION! The amplifier runs on 230V AC voltage. Removing the cover will expose you to a potentially dangerous voltage! Do not use the unit if the electrical power cord is frayed or broken.

Power is supplied from 230V AC single-phase grounded 50/60 Hz source!

CAUTION! The amplifier can yield **dangerous** output voltage! Do not touch the non-insulated cable parts, connected to the unit in operation!

CAUTION! The high sound pressure level of speaker systems generated by high output power, delivered by the amplifier, may be hazardous to your hearing. Please, take adequate safety precautions.

WARNING! The amplifier yields high output power. The manufacturer shall not be held responsible for any damage to the speakers caused by excessive power from the unit.

WARNING SIGNS:



Important information!

Intended to warn the user about any important applicable information contained in this Owner's Manual.



Hazardous voltage inside!

Intended to warn the user about electric shock hazard due to high voltage inside the product.

GENERAL

DF-series with DSP (DF1404 DSP, DF1408 DSP, DF2008 DSP, DF2804 DSP) are modern amplifiers for professional entertainers, who require maximum performance and sound quality on a limited budget. Amplifiers are designed for application in PA systems with high requirements for precise tuning of the parameters, but without the need for operative change.

Built-in **DSP** accurately handles the audio signal due to its functions of equalization, filtering, delay and limiter. Processor has 2 inputs and 4 outputs and provides free signal routing from any input to any output.

DSP enables users to choose between eight factory preset settings. Setting presets (operation modes) is performed by **DIP** switch. Any of presets can be modified using a computer connected via **USB** interface (software – SigmaStudio by Analog Devices, Inc.).

ATTENTION! *The **DF1404 DSP, DF1408 DSP, DF2008 DSP** and **DF2804 DSP** amplifiers have the same design and functional features and differ only in the schematics elements, output power and weight. Unless specified otherwise, the word «amplifier» hereinafter applies to any of the above models..*

To ensure the most advantageous and faultless operation of the amplifier, please, read this Manual before use.

UNPACKING

The manufacturer's quality control system provides for careful examination of each product before it leaves the factory to ensure its flawless appearance. After unpacking, please, check the unit for any physical damage. In case of damage, please, contact your local dealer. Keep the shipping carton and all packing material, as you may require them for reshipment of the unit.

DESIGN FEATURES

Physical Design

The amplifier is enclosed in a metal (steel) case of 88 mm (2U) height. The amplifier is designed to be standard rack-mounted (RACK 19").

Power Supply Unit

All four channel of the amplifier share the same pulse power supply unit.

Power Factor Correction (*in DF2008DSP only*)

The amplifier has power supply with Power Factor Correction, which significantly reduces load to the mains and also reduces noise and distortion in the mains. What is more important, the amplifier output power is no longer rigorously dependent on the mains voltage.

The amplifier provides full power at the mains voltage from 160 V to 250 V (with no need to use of external AC voltage stabilizer).

Cooling System

The amplifier features a forced cooling system which is common for all four channels. The amplifier and the power supply unit are cooled with a single fan blowing front to rear. The cooling system provides for a double-step intensity-cooling rate switching. At a normal temperature, the fan runs at a low speed, thus generating the least noise possible. When the amplifier is set to deliver a high output power or when the ambient temperature is higher than normal, the cooling system may switch the fan to the other (higher) cooling rate.

Output Stage

The output stage of this digital power amplifier is designed according to Class D technology to deliver high efficiency and least heat. The high switching rate ensures the high sound quality comparable with the best analogue amplifiers.

Balanced Inputs

The use of balanced inputs provides for an essential reduction of the environment-induced hum and noise interference with long input connecting cables.

Line Outputs

The amplifier line outputs are parallel to the inputs (each along the respective channel) and provide for parallel connection of several amplifiers with standard signal cables using **XLR** connectors.

If necessary, the signal, processed by the **DSP**, can be applied to the line outputs. This mode is set at the factory or by the customer (manufacturer get corresponding instructions by e-mail: support@parkaudio2.com).

DSP

Built-in **DSP** accurately handles the audio signal due to its functions of equalization, filtering, delay and limiter. Processor has 2 inputs and 4 outputs and provides free signal routing from any input to any output.

DSP enables users to choose between eight factory preset settings. Preset parameters are listed on the insert in the **Owner's Manual**.

Any of presets can be modified, using a computer connected via USB interface (software – **SigmaStudio** by **Analog Devices, Inc.**).

The installation package of the **SigmaStudio** ver.3.10 (32-bit and 64-bit program versions available) software and user manual can be downloaded from the site parkaudio.ua (**Download** section on the pages of the corresponding amplifiers). Moreover, in the **Download** section you can find:

SigmaStudio User Manual – user guide on setting built-in amplifiers with DSP by SigmaStudio.

SigmaStudio Video Tutorial – video tutorial about setting amplifiers with DSP by SigmaStudio.

Limiters' User Manual – recommendations on limiters setting in signal processing tracts;

Project Templates – SigmaStudio project template for amplifiers with DSP ;

DF-series Factory DSP Presets – DSP preset settings description.

Limiters' Setting Calculations – simple calculator (Excel) to calculate the parameters of the limiter.

DSP PRESET Switch

The amplifier modes (DSP presets) can be switched by the **DIP** switch, located on the rear panel.

Input Level Attenuators

These allow setting the amplifier to the required sensitivity (each channel individually) which is very helpful when several amplifiers are used to drive different types of loudspeakers or are used within multi-speaker sound reinforcement systems. The attenuators are located on the front panel.

Detachable Power Cord

This feature is provided for convenience of transportation and rack mounting.

FUNCTIONAL FEATURES

Overload and Short-Circuit Protection

Individual per each channel. This protective system becomes active in case of short-circuited output or overload caused by reduced load impedance. It disables the output signal of the respective channel for 0.5 second and then the amplifier gradually resumes its delivery.

DC Output Protection

The amplifier's schematics precludes transit of any clicks or noise during the power-on/off transition process. The power source unit is responsible for preventing any DC damage to loudspeakers. In the event of output DC voltage or any powerful LF fluctuations, the power source unit goes off and all indicators, including the POWER LED, go off too.

The amplifier can be restarted in 2 or 3 minutes by power off and power on the amplifier with the POWER switch. If the DC is an occasional problem (which is unlikely) the amplifier goes on and resumes its normal operation. If the DC output voltage is still present, the protection system will again turn off the power supply.

Thermal Protection

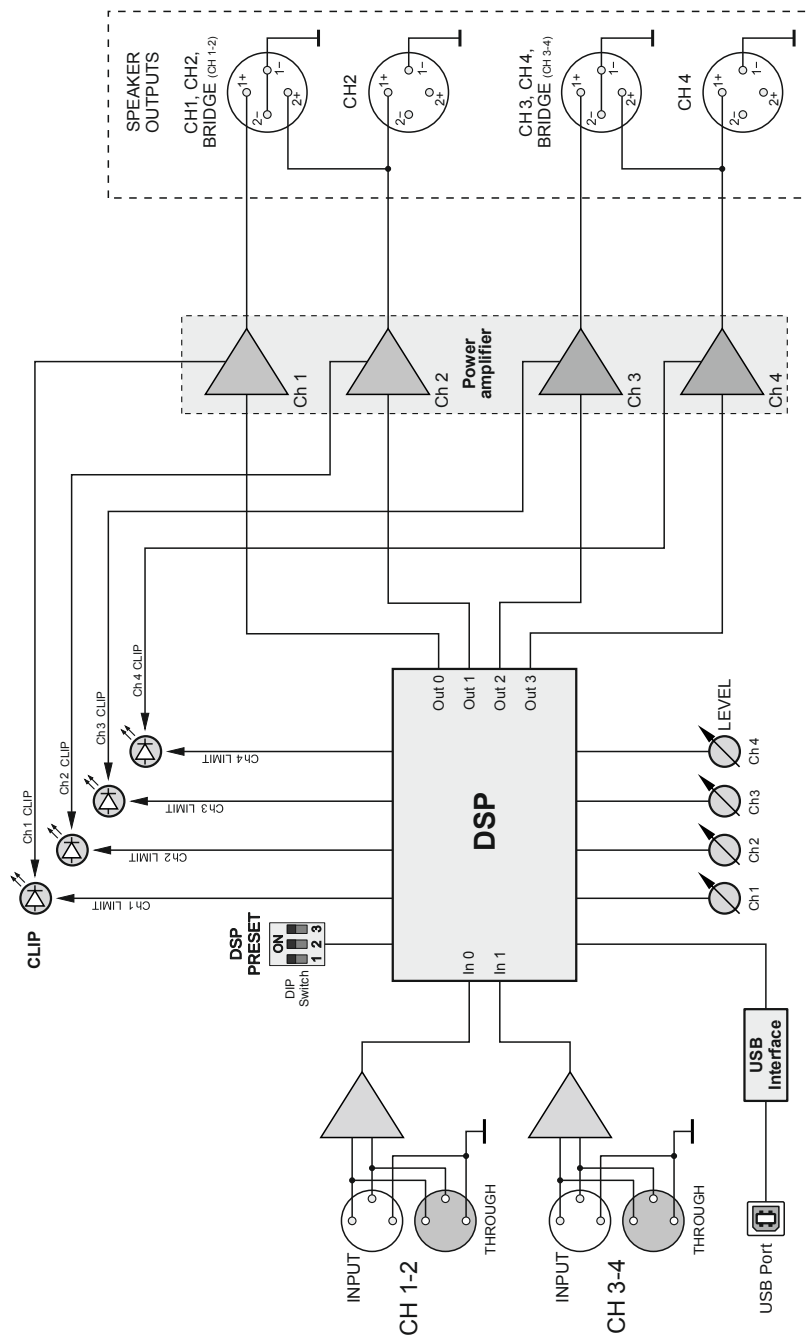
Independent for each channel. In this case upon reaching 85°C, the independent protection system disables the respective channel of the amplifier. The CLIP LED goes on and the SIGNAL LED of the affected channel goes off.

As soon as the amplifier cools down, the affected channels gradually regain their amplification level up to the set value.

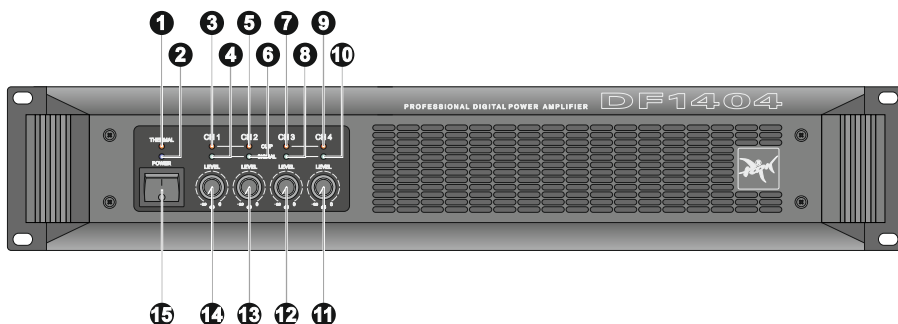
Soft Signal Start

During the power-on process, this feature ensures smooth rise amplification level from zero to the set value.

BLOCK DIAGRAM



FRONT PANEL



1 THERMAL – overheating alarm LED.

Brightness depends on the temperature of the heat sink (See: Thermal Protection).

2 POWER LED.

LED goes off when the DC output protection system activated.

3 5 7 9 CLIP – clip LEDs for Channels 1, 2, 3 and 4, respectively.

They indicate:

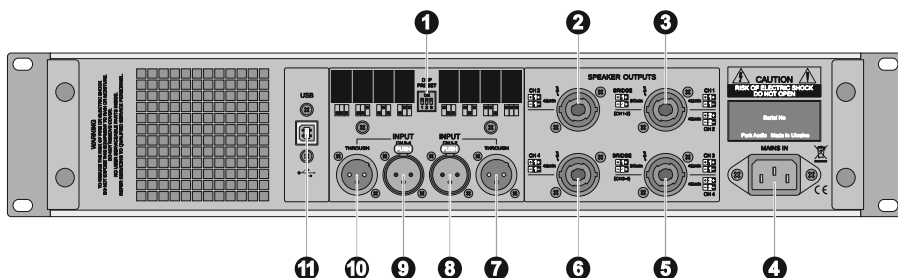
- overload condition causing distortion;
- activation of DSP limiter;
- activation of thermal protection system which disables the respective channel (the SIGNAL LED goes off). (See: Thermal Protection).

4 6 8 10 SIGNAL LEDs, indicating output signal on Channels 1, 2, 3 and 4, respectively.

11 12 13 14 LEVEL – input (sensitivity) level attenuators for Channels 4, 3, 2 and 1, respectively.

15 POWER switch.

REAR PANEL



1 DSP PRESET – the amplifier modes **DIP**-switch.

2 3 5 6 SPEAKER OUTPUTS – output **SpeakOns**, used to connect to loudspeakers. The signals, applied to the output connectors, and their polarity are shown on the rear panel of the amplifier.

4 MAINS IN – power cord socket for 230V AC 50/60Hz grounded mains.

7 10 THROUGH – line outputs (XLR male). Are used to send input signal along the respective input of another amplifier. **THROUGH** connectors are parallel to respective **INPUT** (**CH1-2**, **CH3-4**) connectors.

8 9 INPUT – balanced inputs (XLR female).

11 USB – port for connection to personal computer.

CABLE REQUIREMENTS

Input Cables

Make sure to use only shielded cables whether balanced or unbalanced. Shielding, when properly grounded, protects a signal against external electrical interference.

As a rule, unbalanced lines over 3 meters long are not acceptable. Greater distances require a balanced cable. Avoid placing input cables close to power cords or power transformers.

Output Cables

The amplifier is capable of delivering high level output current; therefore, the wire gauge used for speaker cables is particularly important. Inadequate wire gauge adds significant resistance to the speaker's own impedance, reducing the power, which is actually delivered to the speaker. It will also result in a decreased damping factor and possible fire hazard.

Since the power, applied to the loudspeaker, is of primary concern in system design, we have included the table below to allow you determine the appropriate wire gauge for your application.

Power Loss in a 10-meter Cable

Wire Gauge	Cable Resistance	Cable Power Loss	
		4 Ohms Load	8 Ohms Load
0.50 mm ²	0.72 Ohms	15.4 %	8.3 %
0.75 mm ²	0.49 Ohms	10.9 %	5.8 %
1.00 mm ²	0.36 Ohms	8.3 %	4.3 %
1.50 mm ²	0.24 Ohms	5.7 %	2.9 %
2.00 mm ²	0.18 Ohms	4.3 %	2.2 %
2.50 mm ²	0.15 Ohms	3.6 %	1.8 %
4.00 mm ²	0.09 Ohms	2.3 %	1.1 %

The table shows the percentage of the power loss in a 10-meter copper multiple-core cable. This table reflects the power loss as a percentage of the output power of the amplifier applied to the load. Use this table to determine the power loss to the load at other cable lengths. For example, if you plan to deliver 100 Watts to 8-Ohms load through 20-m cable of 0.75-mm² gauge, the power loss in the cable would be 5.8 % x 2=11.6 % of 100 W or 11.6 W lost in the cable.

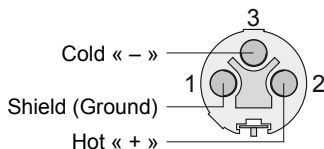
INPUT AND OUTPUT CONNECTORS

Input Connectors

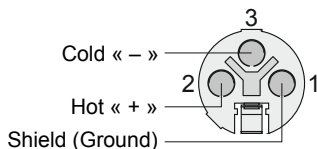
Use **XLR** (male) connectors to connect to the amplifier inputs and **XLR** (female) connectors to line outputs.

See the wiring on the figures below.

XLR (male)



XLR (female)

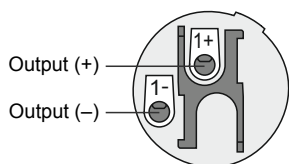


Output Connectors

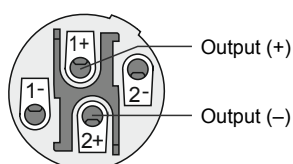
Use **SpeakON NL2FC** or **NL4FC** connectors to connect loudspeakers to the amplifier individual channel outputs. For bridged connection or connection of two channels via a single cable, use **SpeakON NL4FC**.

See the wiring on the figures below.

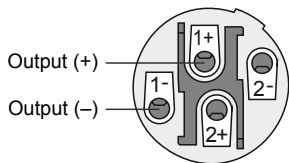
NL2FC for individual channel mode



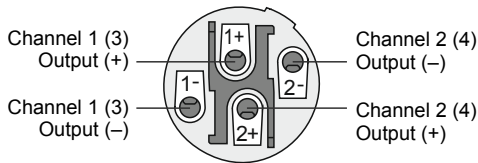
NL4FC or bridge mode (only for Channels 1 & 3 connectors)



NL4FC for individual channel mode



NL4FC for linking up two channels with a single connector (only for Channels 1 & 3 connectors)



CAUTION! Never attempt to jumper or otherwise link up any pins of output connectors.

RACK-MOUNTING REQUIREMENTS

The amplifier is designed to fit a standard 19" rack. While mounting, make sure to provide unhindered air access to the front and rear sides of the rack. Fan direction is from front to back. It is not necessary to leave empty space above or below the amplifier.

For stationary use, it will be enough to fix securely only the front panel of the amplifier to the rack. However, never attempt to transport the unit unless its rear end is properly supported and/or securely fixed, as it may be fraught with danger of damage.

AC POWER REQUIREMENTS

The amplifier is supplied with a three-conductor grounded AC power cord, and should be plugged into a standard 3-wire grounded electrical outlet, which supplies 230 VAC 50/60Hz.

In the event of line voltage sag, the amplifier without PFC will continue to operate normally, albeit with less power. The mains lower voltage limit for the amplifier to retain its operability is ~160 V.

The amplifier with PFC (**DF2008 DSP**) operates at the mains voltage range from ~160 V to ~250 V, giving the full rated output power.

The amplifier is connected to the mains via cable, supplied with the amplifier. When connecting to mains, make sure that no other devices with high power consumption are connected to it, as the normal operation of several such devices may be impossible.

The actual AC current consumption depends on the audio signal level and the load impedance. For system design purposes it must be noted, that for typical audio program material the amplifiers, driving all channels at nominal impedance, just peaking at the clipping level, have the following average power consumption:

- 2.2 A* for amplifier **DF1404 DSP** at 4 Ohm load;
- 1.2 A* for amplifier **DF1404 DSP** at 8 Ohm load;
- 2.2 A* for amplifier **DF1408 DSP** at 8 Ohm load;
- 3.2 A* for amplifier **DF2008 DSP** at 8 Ohm load;
- 4.5 A* for amplifier **DF2804 DSP** at 4 Ohm load;
- 2.3 A* for amplifier **DF2804 DSP** at 8 Ohm load.

* At the mains voltage 230 V AC. For the amplifier with PFC (**DF2008 DSP**) in the low mains voltage, the current consumption increases.

In order to reduce the AC hum, please, plug all sound equipment, interconnected with signal cables, into the same power mains outlet.

AMPLIFIER OPERATION MODES

The amplifier can operate in four-, three- and two-channel modes (respectively: each channel independently, the two channels in a bridge mode and the other two separately, two pairs of channels in a bridge mode). The amplifier has two input channels. Signals routing for four channels is performed by the **DSP** engine.

DSP settings control, presets storing and the creation of the original signal processing template is performed by personal computer with SigmaStudio editor, installed to it.

Setting the high-pass filter and crossover filter parameters, EQ settings, desired signal delay, as well as a number of other parameters can be performed by the DSP engine, as described in **SigmaStudio User Manual**.

For the consumer's convenience the amplifier has 8 presets, which provides a number of the most frequently used switch configurations and settings. DSP presets settings and block diagrams of the connections to the amplifier are in the Owner's Manual. Switching the amplifier **DSP** presets is performed by the **DIP** switch, located on the rear panel of the amplifier.

SPECIFICATIONS

Number of output channels	4
Number of input channels	2
Number of operating modes	8
Output Power *:	
– DF1404 DSP	4 x 350/200 W (4/8 Ohm, 230 V) 2 x 700 W (bridge, 8 Ohm, 230 V)*
– DF1408 DSP	4 x 350 W (8 Ohm, 230 V) 2 x 700 W (bridge, 16 Ohm, 230 V)*
– DF2008 DSP	4 x 500 B_T (8 Ohm, 160–250 V) 2 x 1000 W (bridge, 16 Ohm, 160-250 V)*
– DF2804 DSP	4 x 700/380 W (4/8 Ohm, 230 V) 2 x 1400 W (bridge, 8 Ohm, 230 V)*
Frequency Response	20 Hz – 20 kHz (± 0.5 dB, P _{nom.})
Total Harmonic Distortion	0.05 % (20 Hz – 20 kHz)
Slew Rate	20/40 V/μs (channel / bridge)
Damping Factor	over 200 (200 Hz, 8 Ohm)
Channel Separation	60 dB (1 kHz)
Signal-to-Noise Ratio	95 dB (unweighted)
Input Impedance	10 kOhm (balanced)
Sensitivity	0.775 V
Maximum Input Level	2.45 V (+10 dBu)
Power Requirements**	~230 V, 50/60 Hz
Weight:	
– DF1404 DSP, DF1408 DSP	6.8 kg
– DF2008 DSP	7.4 kg
– DF2804 DSP	7.6 kg
Dimensions	482 mm (W), 96 mm (H), 462 mm (D)
Built-in DSP:	Sampling rate – 48 kHz. DAC/ADC – 24-bit. Internal processing – 56-bit. 2 inputs, 4 outputs.

Note.

* Bridge mode for channels 1-2 and 3-4.

** For the **DF2008 DSP** amplifier at the mains voltage range ~160-250V.

OPERATING CONDITIONS

Ambient Temperature

5 ... 35°C

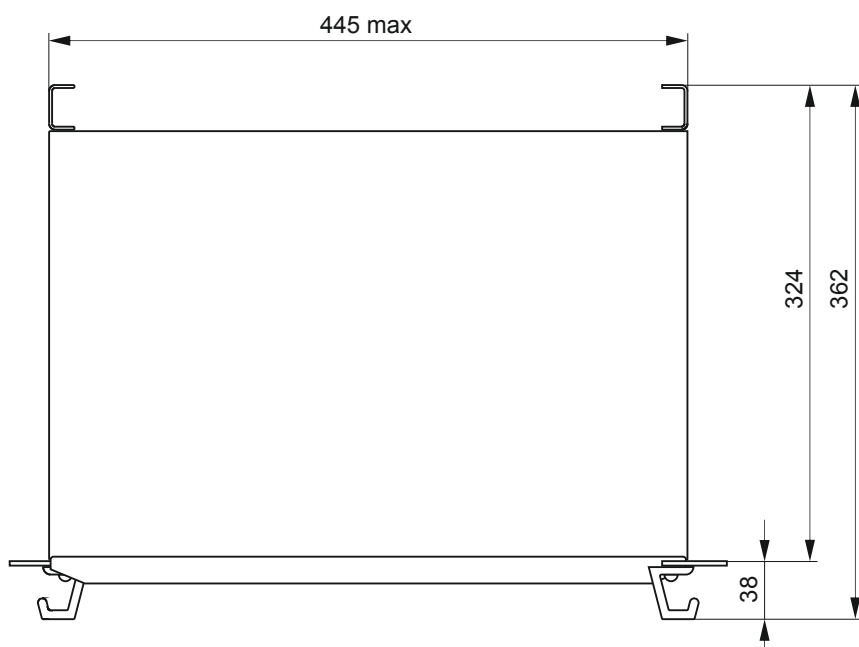
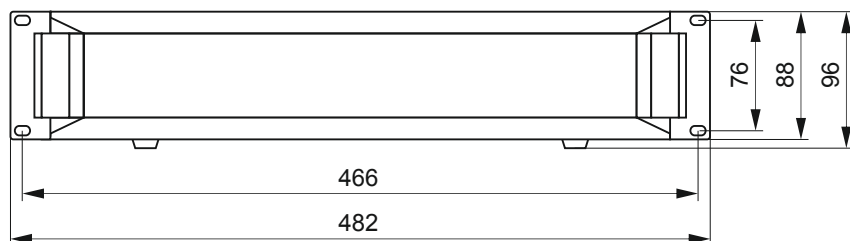
Atmospheric Pressure

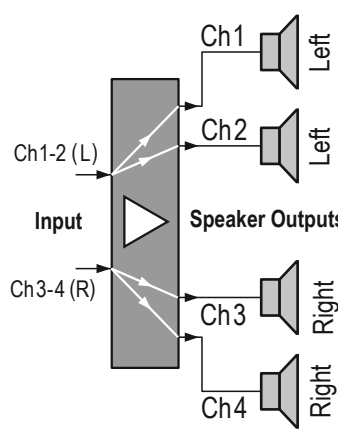
86.6 ... 106.7kPa (650 ... 800mmHG)

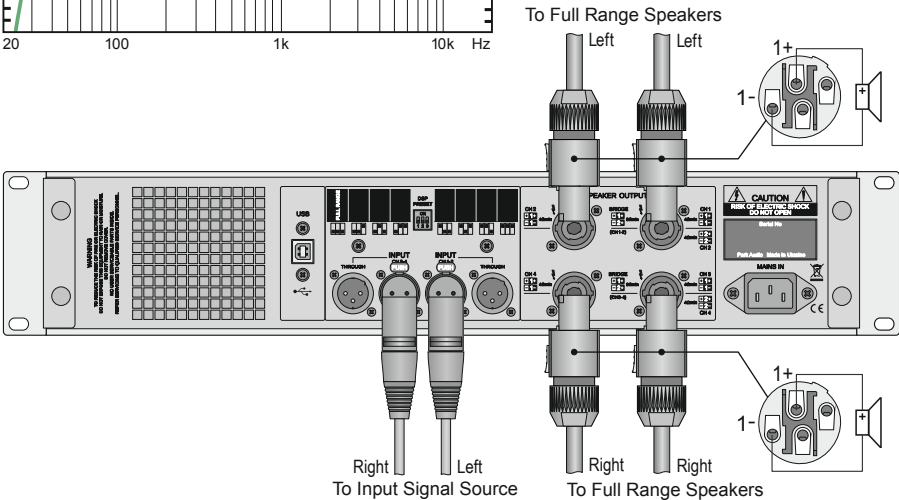
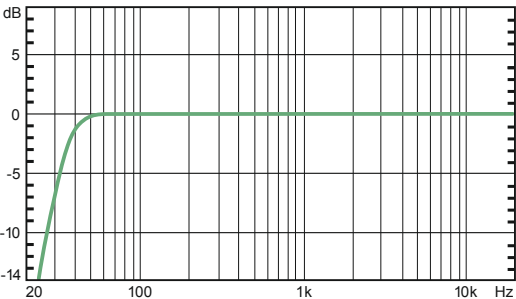
Relative Humidity

less than 80%

DIMENSIONS



Speaker Outputs	Ch1	Function Full Range Routing Input Ch1-2 (gain 0dB) HPF Freq. 35Hz HPF Type BTW 24dB/oct	
	Ch2	Function Full Range Routing Input Ch1-2 (gain 0dB) HPF Freq. 35Hz HPF Type BTW 24dB/oct	
	Ch3	Function Full Range Routing Input Ch3-4 (gain 0dB) HPF Freq. 35Hz HPF Type BTW 24dB/oct	
	Ch4	Function Full Range Routing Input Ch3-4 (gain 0dB) HPF Freq. 35Hz HPF Type BTW 24dB/oct	



Preset 001

«Bridge Full Range»

Speaker Outputs		Ch1	Function Bridge Full Range Routing Input Ch 1-2 (gain 0dB) HPF Freq. 35Hz HPF Type BTW 24dB/oct
		Ch2	
		Ch3	Function Bridge Full Range Routing Input Ch 3-4 (gain 0dB) HPF Freq. 35Hz HPF Type BTW 24dB/oct
		Ch4	

Bridge Ch1-2

Ch1-2 (L)

Input

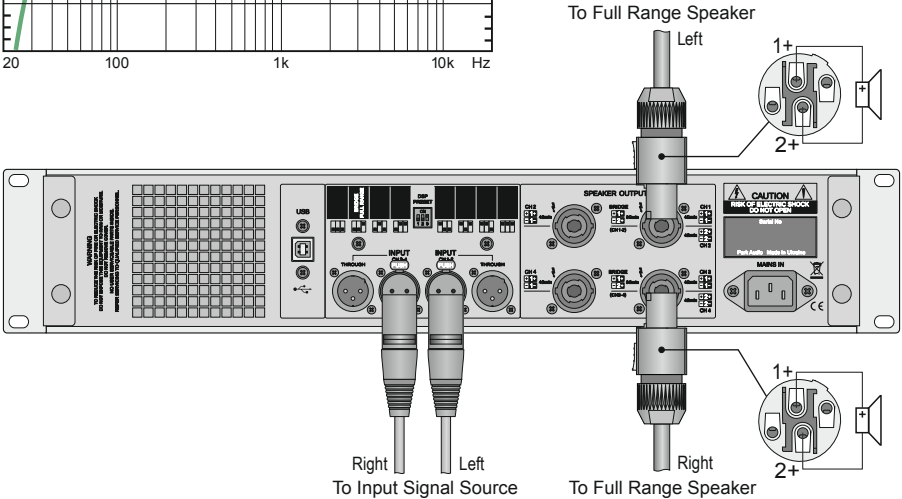
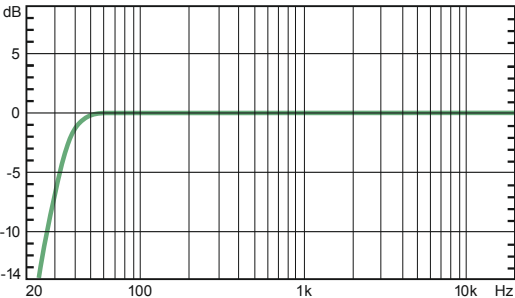
Ch3-4 (R)

Speaker Outputs

Left

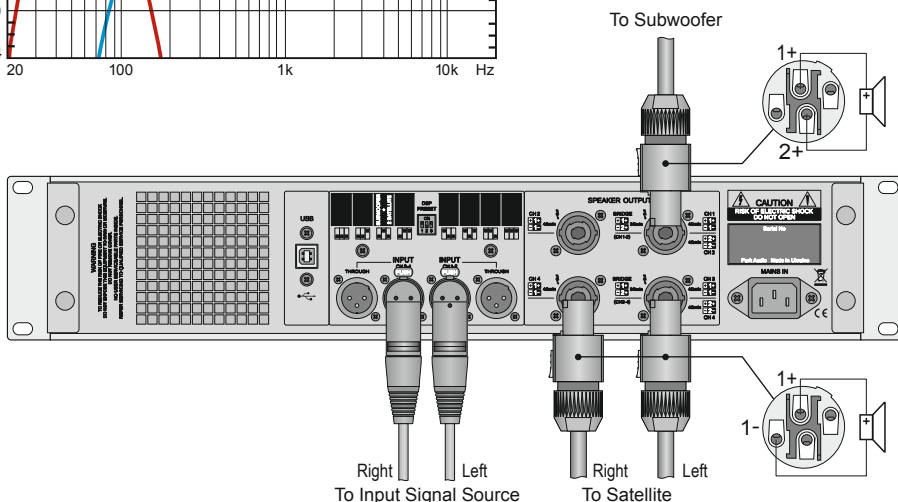
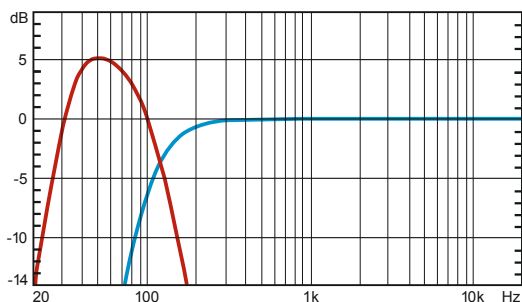
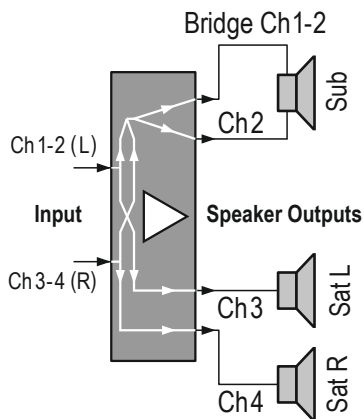
Right

Bridge Ch3-4



Preset 010 «Subwoofer + 2 Satellite (100Hz)»

Speaker Outputs	Ch1	Function Bridge Subwoofer (L+R) Routing Input Ch1-2 (gain 0dB) Input Ch3-4 (gain 0dB) HPF Freq. 35Hz HPF Type BTW 24dB/oct. LPF Freq. 100 Hz LPF Type LR 24 dB/oct.
	Ch2	
	Ch3	Function Satellite Left Routing Input Ch1-2 (gain 0dB) HPF Freq. 100 Hz HPF Type LR 24dB/oct.
	Ch4	Function Satellite Right Routing Input Ch3-4 (gain 0dB) HPF Freq. 100 Hz HPF Type LR 24 dB/oct.



Preset 011

«Subwoofer + 2 Satellite (125Hz)»

Speaker Outputs	Ch1	Function Routing	Bridge Subwoofer (L+R) Input Ch 1-2 (gain 0dB) Input Ch3-4 (gain 0dB)
	Ch2	HPF Freq. HPF Type LPF Freq. LPF Type	35 Hz BTW 24dB/oct. 125 Hz LR 24dB/oct.
	Ch3	Function Routing HPF Freq. HPF Type	Satellite Left Input Ch 1-2 (gain 0dB) 125 Hz LR 24dB/oct.
	Ch4	Function Routing HPF Freq. HPF Type	Satellite Right Input Ch3-4 (gain 0 dB) 125 Hz LR 24dB/oct.

Bridge Ch1-2

Ch2

Sub

Ch1-2 (L)

Input

Ch3-4 (R)

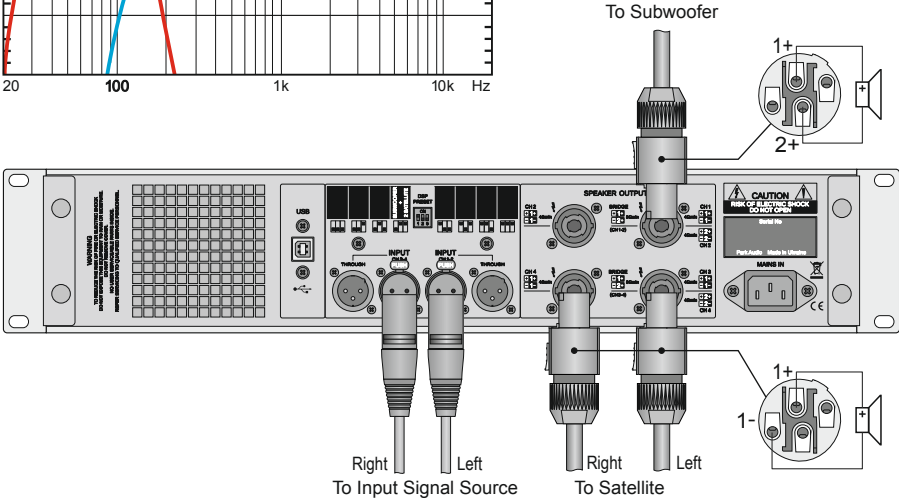
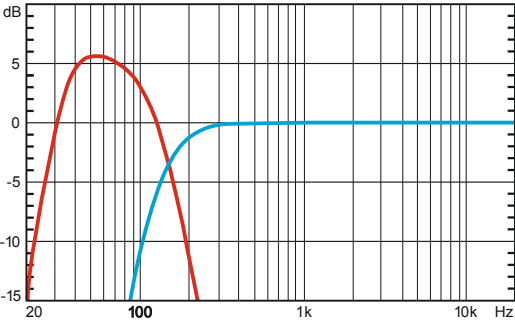
Ch3

Sat L

Ch4

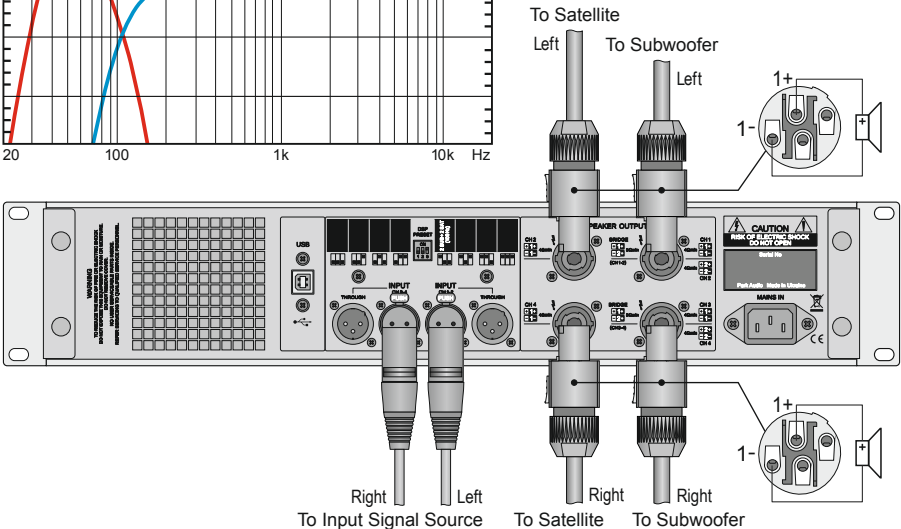
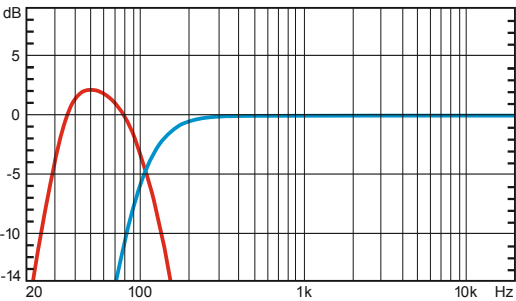
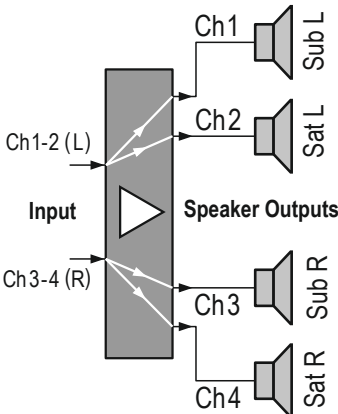
Sat R

Speaker Outputs



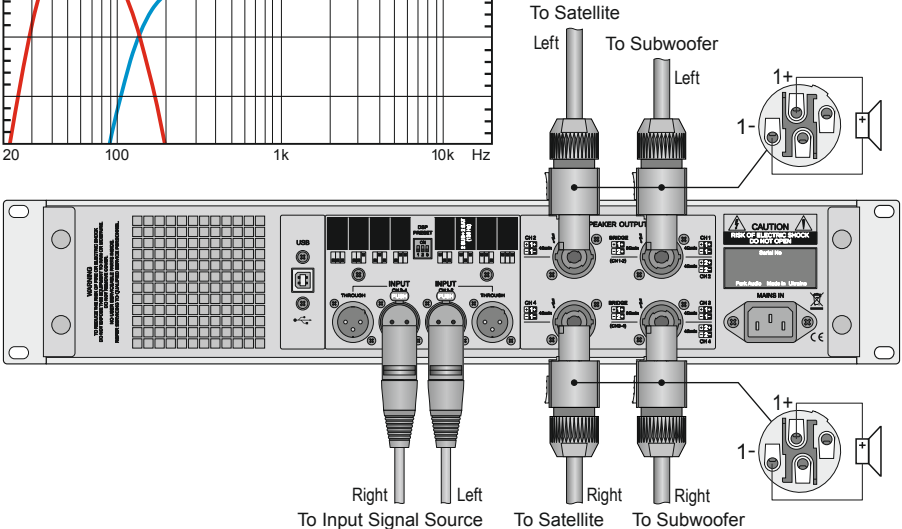
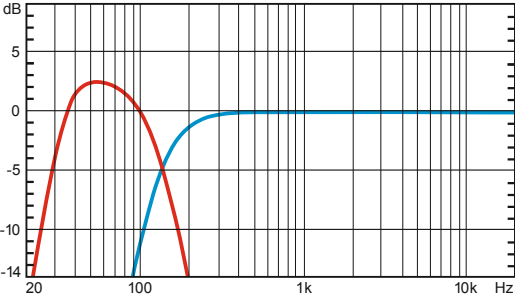
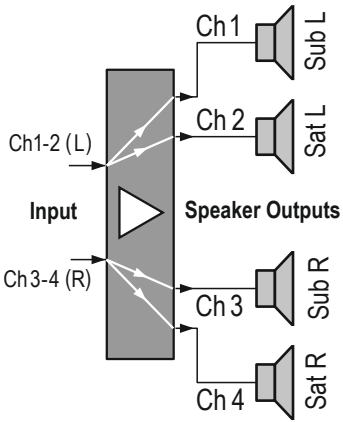
Preset 100 «2 Subwoofer + 2 Satellite (100 Hz)»

Speaker Outputs	Ch1	Function Routing HPF Freq. HPF Type LPF Freq. LPF Type	Subwoofer Left Input Ch1-2 (gain +3 dB) 35 Hz BTW 24 dB/oct 100 Hz LR 24 dB/oct
	Ch2	Function Routing HPF Freq. HPF Type	Satellite Left Input Ch 1-2 (gain 0 dB) 100 Hz LR 24 dB/oct
	Ch3	Function Routing HPF Freq. HPF Type LPF Freq. LPF Type	Subwoofer Right Input Ch3-4 (gain +3 dB) 35 Hz BTW 24 dB/oct 100 Hz LR 24 dB/oct
	Ch4	Function Routing HPF Freq. HPF Type	Satellite Right Input Ch3-4 (gain 0 dB) 100 Hz LR 24 dB/oct

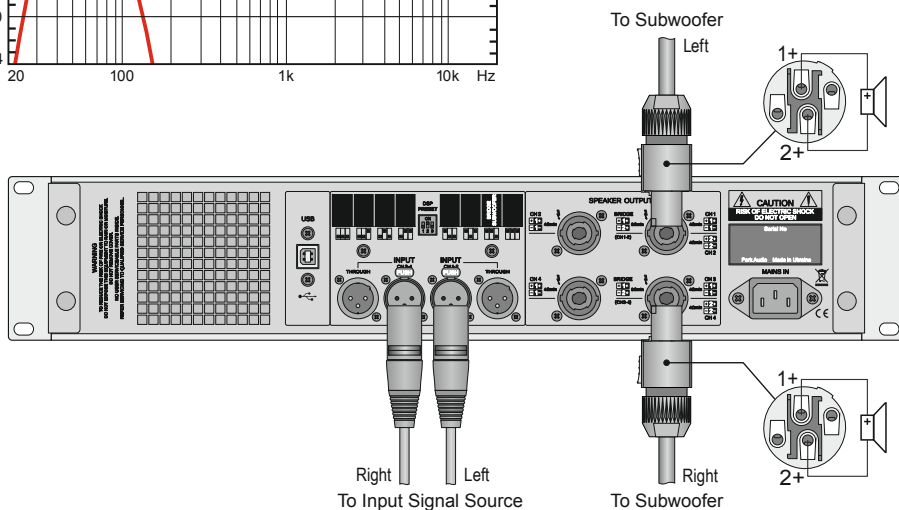
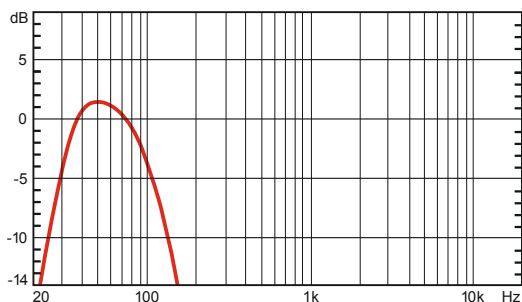
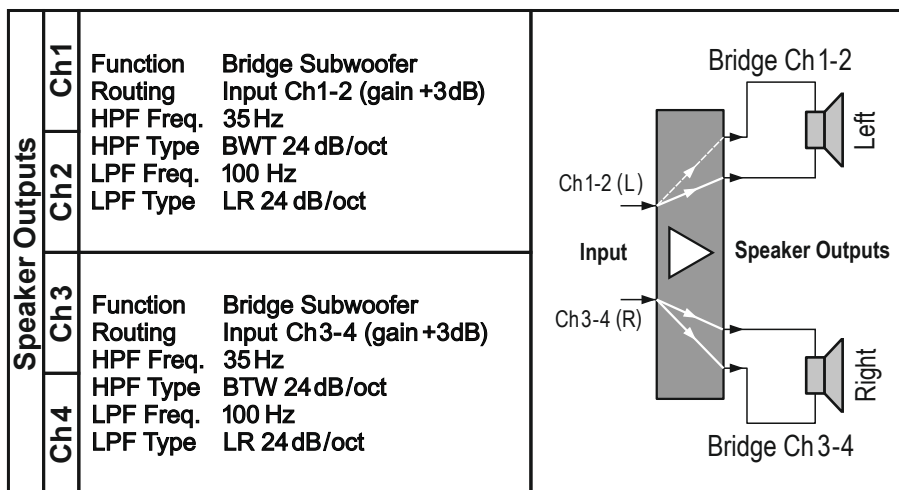


Preset 101 «2 Subwoofer + 2 Satellite (125Hz)»

Speaker Outputs	Ch1	Function Routing HPF Freq. HPF Type LPF Freq. LPF Type	Subwoofer Left Input Ch1-2 (gain +3dB) 35 Hz BTW 24 dB/oct 125 Hz LR 24dB/oct
	Ch2	Function Routing HPF Freq. HPF Type	Satellite Left Input Ch1-2 (gain 0dB) 125 Hz BTW 24dB/oct
	Ch3	Function Routing HPF Freq. HPF Type LPF Freq. LPF Type	Subwoofer Right Input Ch3-4 (gain +3dB) 35 Hz BTW 24 dB/oct 125 Hz LR 24dB/oct
	Ch4	Function Routing HPF Freq. HPF Type	Satellite Right Input Ch3-4 (gain 0dB) 125 Hz LR 24dB/oct



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Preset 111

«3-Way»

Speaker Outputs	Ch1	Function Bridge Subwoofer Routing Input Ch1-2 (gain +3dB) HPF Freq. 35 Hz HPF Type BTW 24dB/oct. LPF Freq. 100 Hz LPF Type LR 24dB/oct.
	Ch2	
	Ch3	Function Satellite Mid Band Routing Input Ch1-2 (gain 0 dB) HPF Freq. 100 Hz HPF Type LR 24dB/oct. LPF Freq. 1200 Hz LPF Type LR 24dB/oct.
	Ch4	Function Satellite High Band Routing Input Ch1-2 (gain 0 dB) HPF Freq. 1200 Hz HPF Type LR 24dB/oct.

Bridge Ch1-2

Ch2

Sub (Lo)

Input Ch1-2

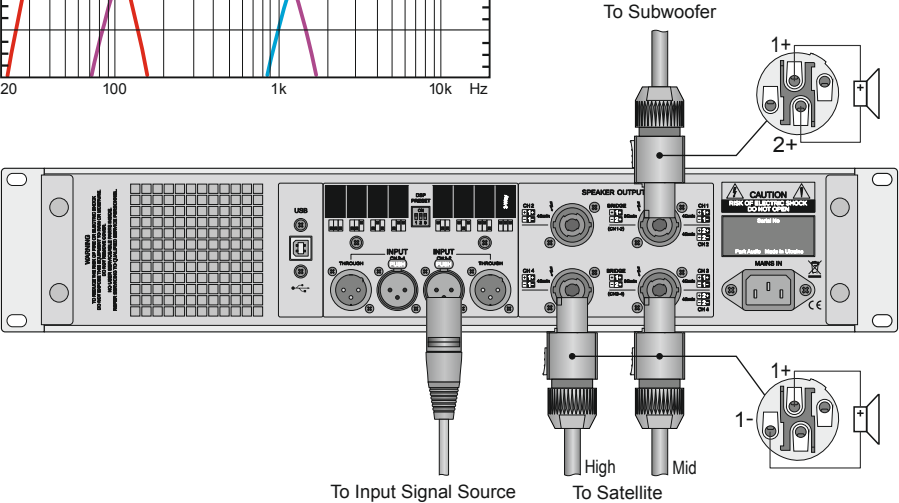
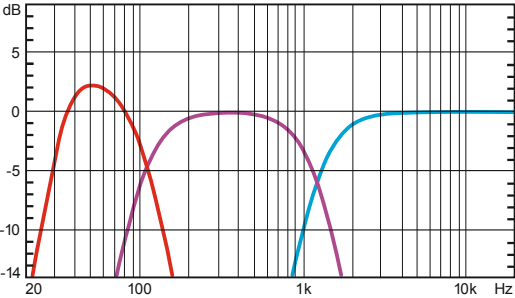
Speaker Outputs

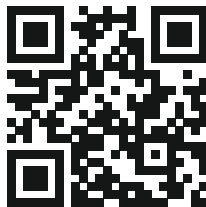
Ch3

Sat (Mid)

Ch4

Sat (Hi)





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