

**PROFESSIONAL
TWO CHANNEL
SWITCHING POWER AMPLIFIER
DF series with DSP**

DF1400 DSP
DF2000 DSP
DF3200 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** (**DF1400 DSP**, **DF2000 DSP**, **DF3200 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 2 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 **DF1400 DSP**, **DF2000 DSP** and **DF3200 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

Both channel of the amplifier share the same pulse power supply unit.

Power Factor Correction (*in DF2000 DSP 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 both 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 line outputs have a post-**DSP** signal. The signal parameters are determined by the selected preset setting. You can change the signal parameters using the **USB** interface.

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 software (32-bit and 64-bit program versions available) 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.

Limiter's 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.

Limiter's 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 de-energizing and re-energizing the amplifier with the POWER switch. If the DC is an occasional problem (which is unlikely) the amplifier goes on and resumes its normal functioning. If, otherwise, the DC output problem persists through the fault of the amplifier, then upon switching, the amplifier goes on, the POWER amplifier goes on but in a short while the DC output protection system disables the power supply source.

Thermal Protection

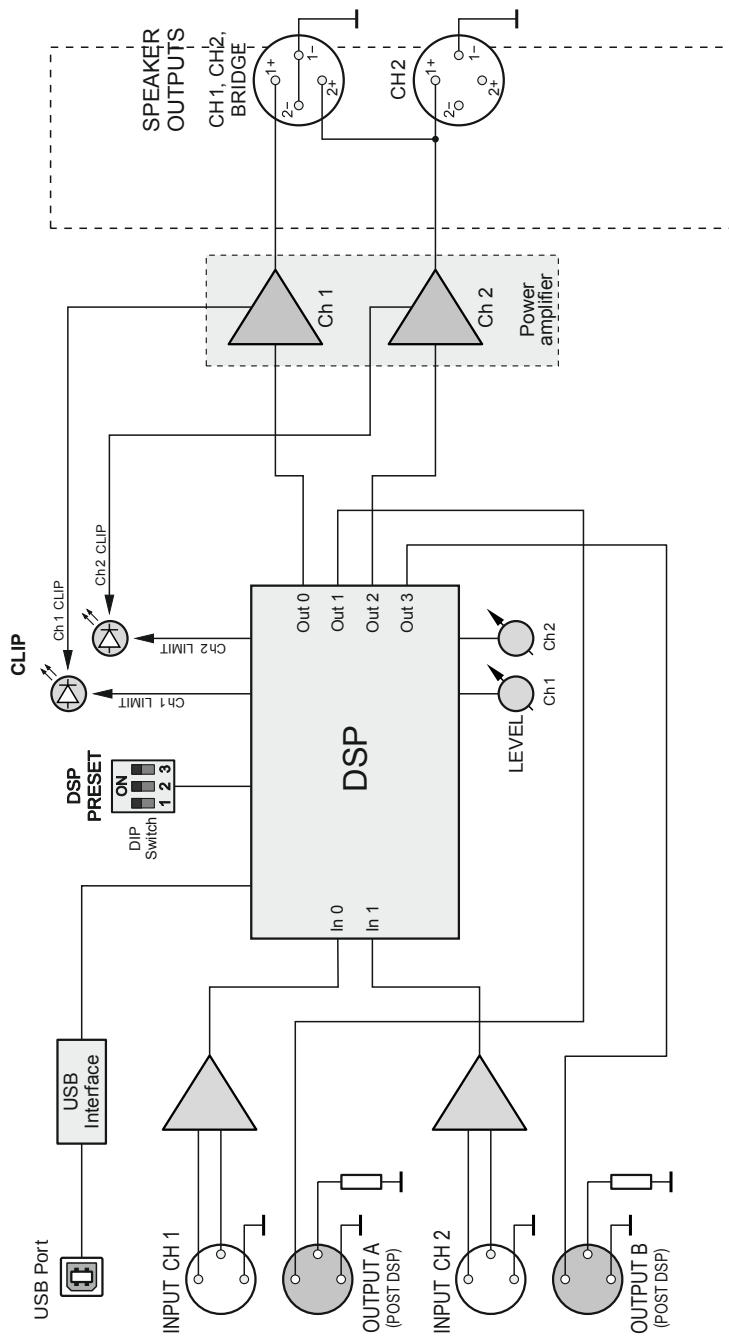
Independent for each channel. In this case upon reaching 85°C, the independent protection system disables the respective channel of the amplifier. The CLIP LED goes on and the SIGNAL LED of the affected channel goes off.

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

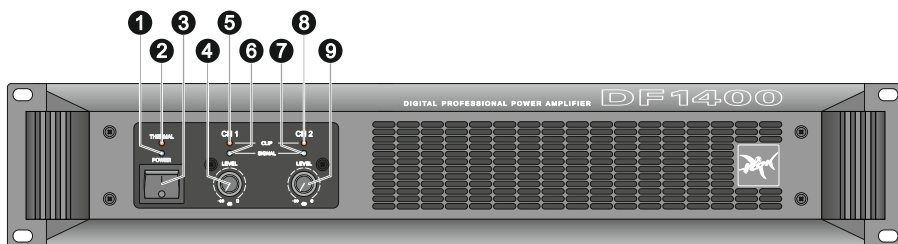
Soft Signal Start

During the power-on process, this feature ensures smooth gain from zero to the maximum level to provide for a smooth rise of the sound level emitted from the loudspeakers.

BLOCK DIAGRAM

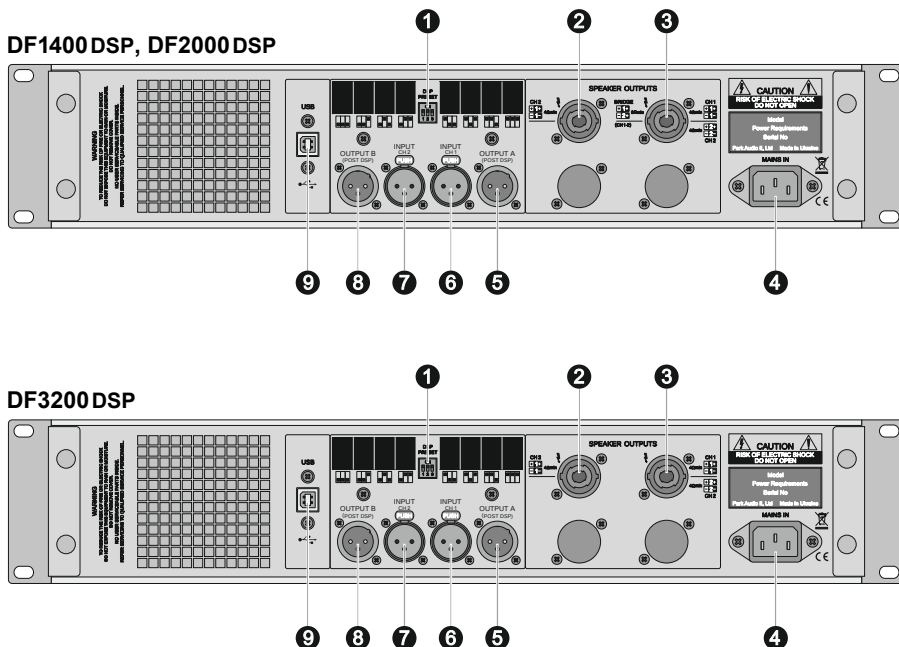


FRONT PANEL



- 1 POWER LED.**
LED goes off when the DC output protection system activated.
- 2 THERMAL** – overheating alarm LED.
Brightness depends on the temperature of the heat sink (See: Thermal Protection).
- 3 POWER** switch.
- 4 9 LEVEL** – input (sensitivity) level attenuators for Channels 1 and 2, respectively.
- 5 8 CLIP** – clip LEDs for Channels 1 and 2, 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).
- 6 7 SIGNAL** – LEDs, indicating output signal on Channels 1 and 2, respectively

REAR PANEL



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

2 3 SPEAKER OUTPUTS – SpeakON output connectors, used to link up to loud-speakers.

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 230 V AC 50/60 Hz grounded mains.

5 8 OUTPUT A, OUTPUT B – line outputs. Used to send the signal, processed by **DSP** engine, to another amplifier.

6 7 INPUT (CH 1, CH 2) – respective inputs (XLR female).

Used to connect input signal.

9 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.

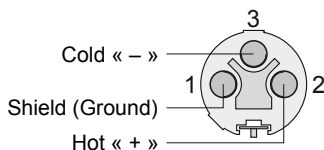
INPUT AND OUTPUT CONNECTORS

Input Connectors

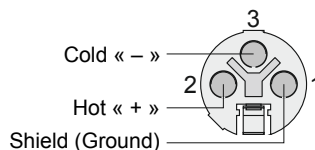
Use **XLR** (male) connectors to connect to the amplifier inputs and **XLR** (female) connectors to line outputs.

See the wiring on the figures below.

XLR (male)



XLR (female)

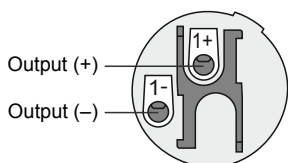


Output Connectors

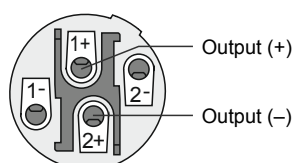
Use **SpeakON NL2FC** or **NL4FC** connectors to connect loudspeakers to the amplifier individual channel outputs. For bridged connection or connection of two channels via a single cable, use **SpeakON NL4FC**.

See the wiring on the figures below.

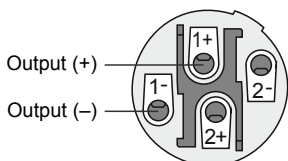
NL2FC for individual channel mode



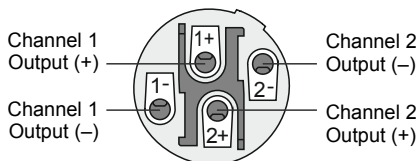
NL4FC or bridge mode (only for Channel 1 connector)



NL4FC for individual channel mode



NL4FC for linking up two channels with a single connector (only for Channel 1 connector)



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 50/60 Hz.

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 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:

- 2.4 A* for amplifier **DF1400 DSP** at 4 Ohm load;
- 1.2 A* for amplifier **DF1400 DSP** at 8 Ohm load;
- 3.4 A* for amplifier **DF2000 DSP** at 4 Ohm load;
- 1.7 A* for amplifier **DF2000 DSP** at 8 Ohm load;
- 5.5 A* for amplifier **DF3200 DSP** at 4 Ohm load;
- 2.8 A* for amplifier **DF3200 DSP** at 8 Ohm load.

Note.

* At the mains voltage 230 V AC. For the amplifiers **DF2000 DSP** (with PFC) at 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 two or one-channel modes (respectively: each channel independently, the two 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 input channels	2
Number of output channels	2 Speaker Out, 2 Line Out (Post DSP)
Number of operating modes	8
Output Power:	
– DF1400 DSP	2 x 700 W / 380 W (4 / 8 Ohm, ~230 V) 1400 W (bridge, 8 Ohm, ~230 V)
– DF2000 DSP	2 x 1000 W / 500 W (4 / 8 Ohm, ~160-250 V) 1900 W (bridge, 8 Ohm, ~160-250 V)
– DF3200 DSP	2 x 1600 W / 1000 W (channel, 4 / 8 Ohm, ~230 V)
Frequency Response	20 Hz – 20 kHz (± 0.5 dB, Pnom.)
Total Harmonic Distorsion	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:	
– DF1400 DSP	6.2 kg
– DF2000 DSP	6.5 kg
– DF3200 DSP	7.7 kg
Dimensions	482 (W) x 96 (H) x 362 (D) mm
Built-in DSP:	Sampling rate – 48 kHz. DAC/ADC – 24-bit. Internal processing – 56-bit. 2 inputs, 4 outputs.

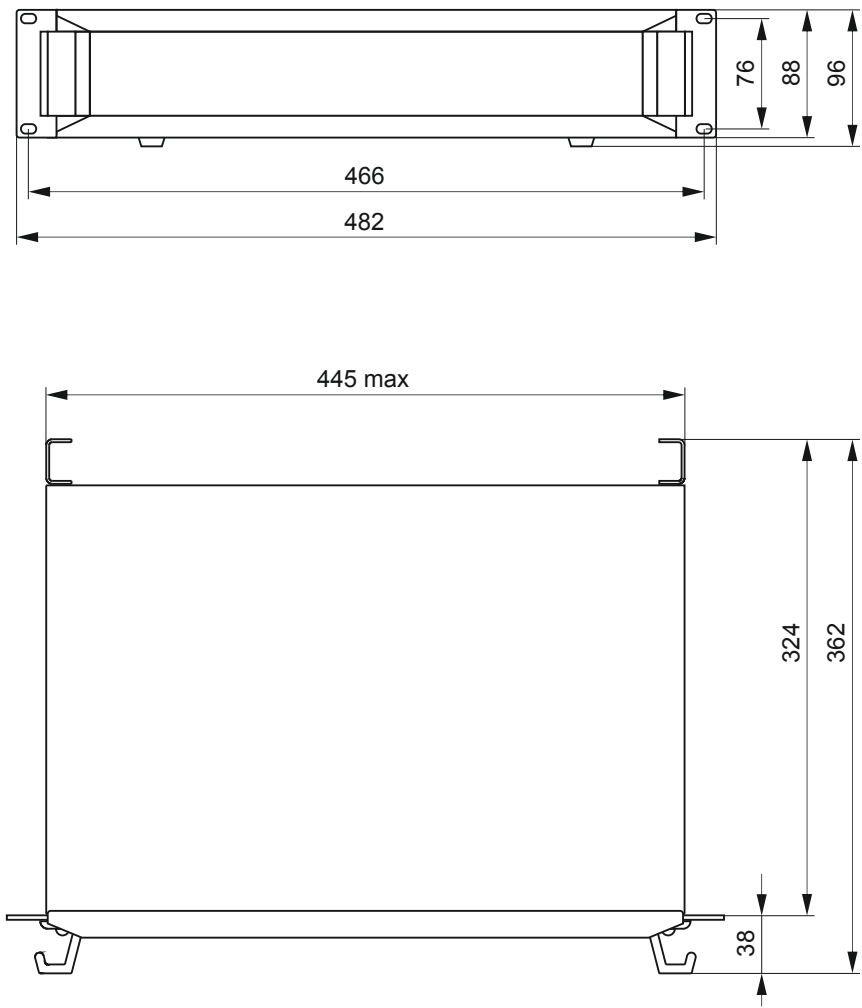
Note.

* For the DF2000 DSP amplifier at the mains voltage range ~160-250 V.

OPERATING CONDITIONS

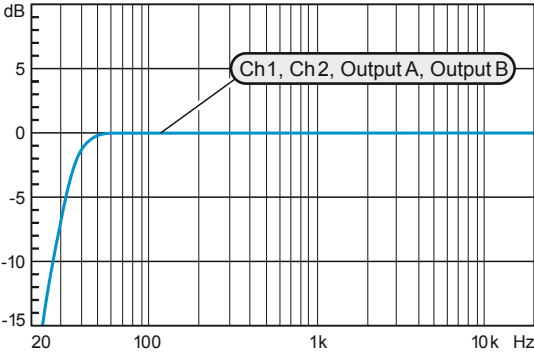
Ambient Temperature	5 ... 35°C
Atmospheric Pressure	86.6 ... 106.7 kPa (650 ... 800 mmHG)
Relative Humidity	less than 80%

DIMENSIONS

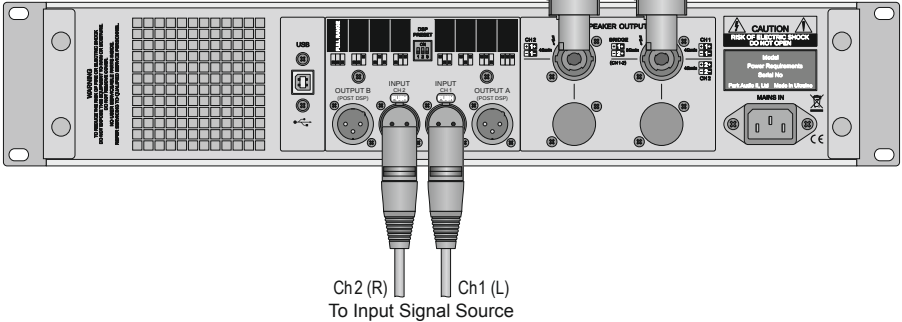
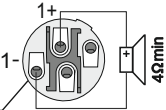


Preset 000 «Full Range»

Speaker Outputs	Ch 1	Function: Full Range Routing: Input Ch1 (gain 0dB) HPF Freq.: 35 Hz (BTW 24dB/oct)
	Ch 2	Function: Full Range Routing: Input Ch 2 (gain 0dB) HPF Freq.: 35 Hz (BTW 24dB/oct)
Line Outputs	Output A	Function: Full Range Routing: Input Ch1 (gain 0dB) HPF Freq.: 35 Hz (BTW 24dB/oct)
	Output B	Function: Full Range Routing: Input Ch2 (gain 0dB) HPF Freq.: 35 Hz (BTW 24dB/oct)

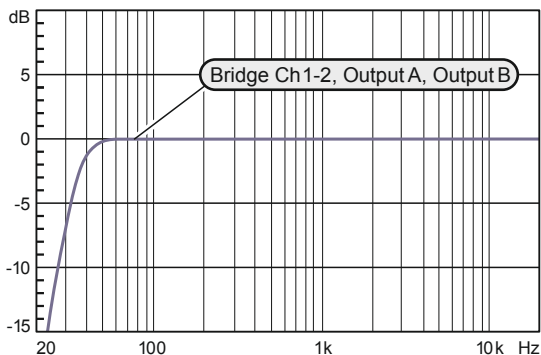
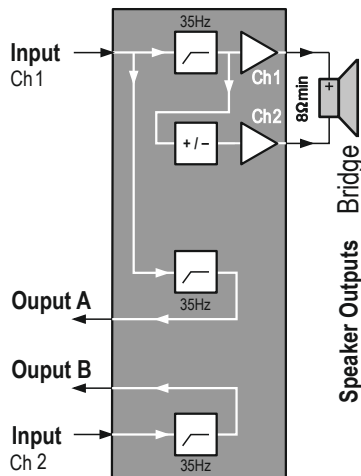


To Full Range Speakers
Speaker R Speaker L



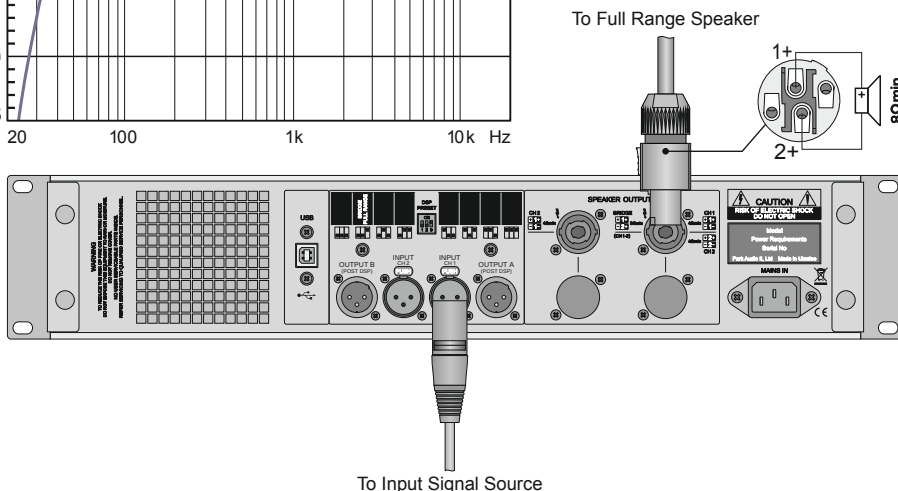
Preset 001 «Bridge Full Range»*

Speaker Outputs	Ch 1	Function: Bridge Full Range Routing: Input Ch 1 (gain 0dB) HPF Freq.: 35 Hz (BTW 24dB/oct)
	Ch 2	
Line Outputs	Output A	Function: Full Range Routing: Input Ch 1 (gain 0dB) HPF Freq.: 35 Hz (BTW 24dB/oct)
	Output B	Function: Full Range Routing: Input Ch 2 (gain 0dB) HPF Freq.: 35 Hz (BTW 24dB/oct)



Note.

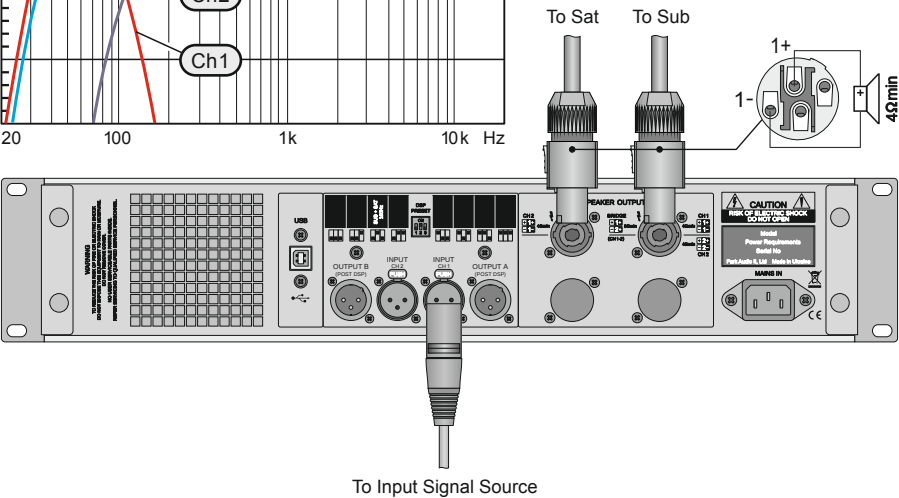
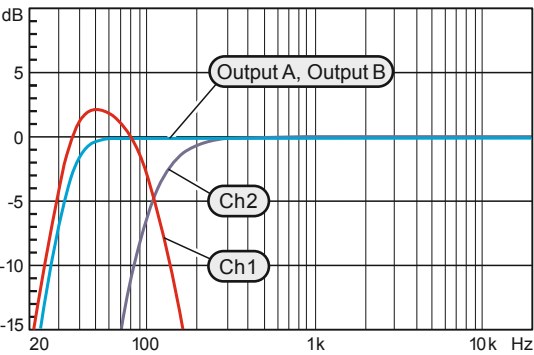
* For amplifier **DF3200 DSP**
 preset 001 matches preset 000
 (no BRIDGE mode in **DF3200 DSP**).



Preset 010

»Subwoofer + 2 Satellite (100Hz)«

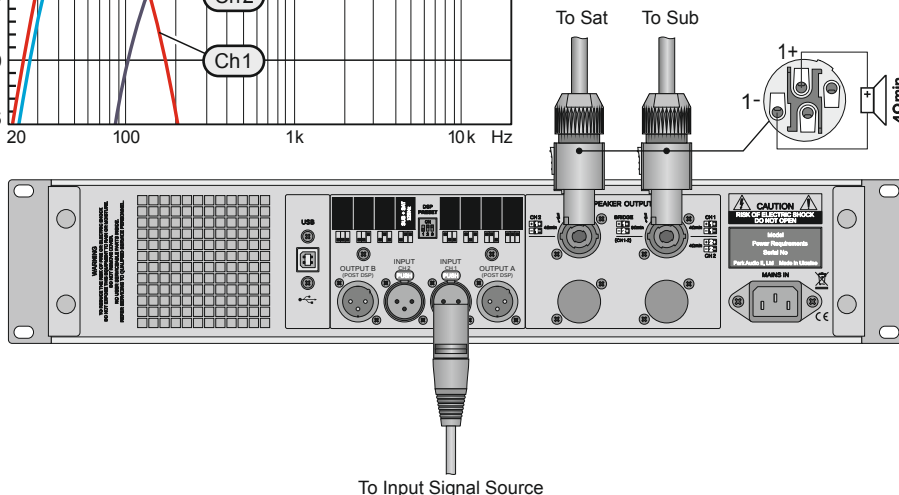
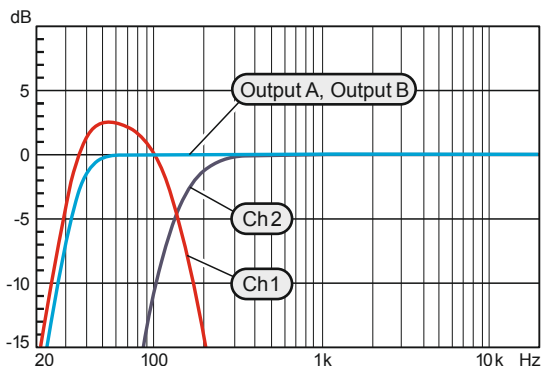
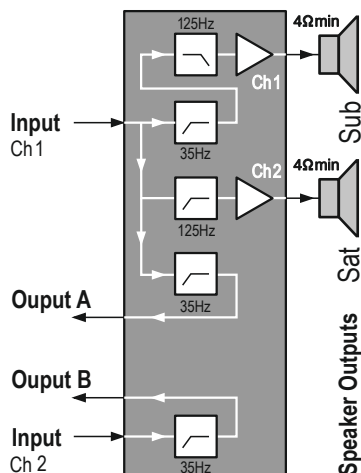
Speaker Outputs	Ch1	Function: Subwoofer Routing: Input Ch1 (gain +3 dB) HPF Freq.: 35 Hz (BTW 24dB/oct) LPF Freq.: 100 Hz (LR 24dB/oct)
	Ch2	Function: Satellite Routing: Input Ch1 (gain 0 dB) HPF Freq.: 100 Hz (LR 24dB/oct)
Line Outputs	Output A	Function: Full Range Routing: Input Ch1 (gain 0dB) HPF Freq.: 35 Hz (BTW 24dB/oct)
	Output B	Function: Full Range Routing: Input Ch2 (gain 0dB) HPF Freq.: 35 Hz (BTW 24dB/oct)



Preset 011

«Subwoofer + Satellite (125Hz)»

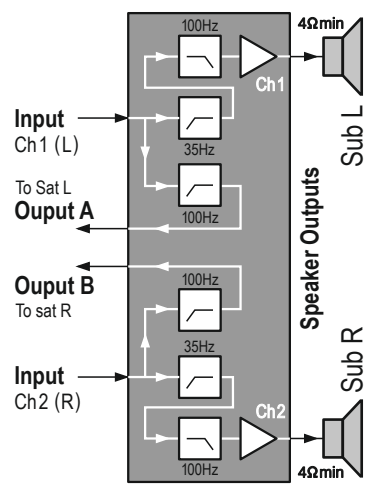
Speaker Outputs	Ch1	Function Routing HPF Freq. LPF Freq.	Subwoofer Input Ch1 (gain +3 dB) 35 Hz (BTW 24dB/oct) 125Hz (LR 24 dB/oct)
	Ch2	Function Routing HPF Freq.	Satellite Input Ch1 (gain 0 dB) 125 Hz (LR 24 dB/oct)
Line Outputs	Output A	Function Routing HPF Freq.	Full Range Input Ch1 (gain 0dB) 35 Hz (BTW 24dB/oct)
	Output B	Function Routing HPF Freq.	Full Range Input Ch2 (gain 0dB) 35 Hz (BTW 24dB/oct)

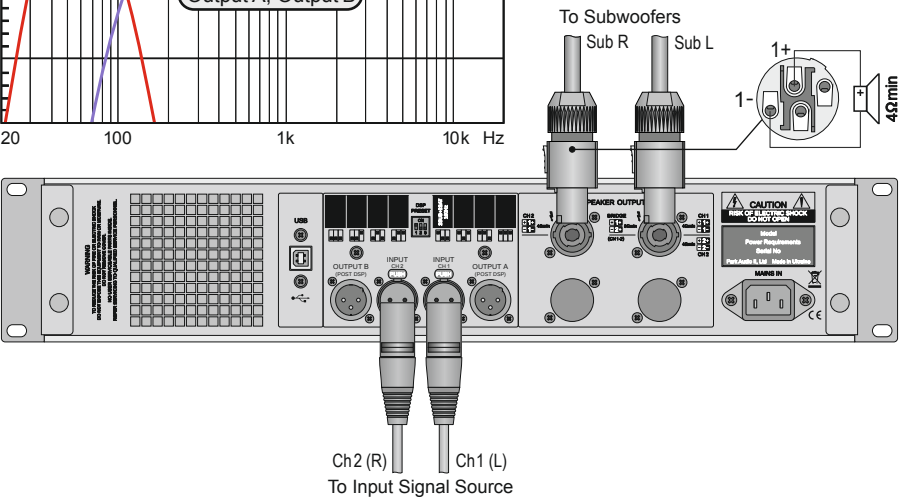
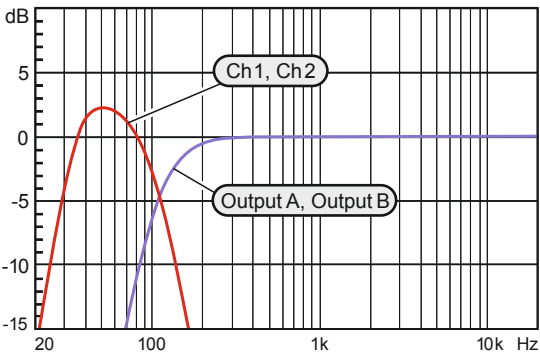


Preset 100 «2 Subwoofer + 2 Satellite (100 Hz)»

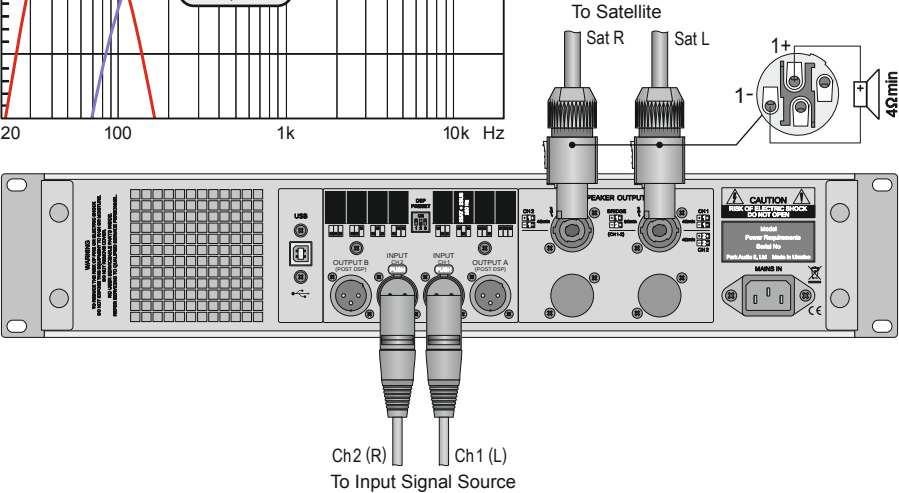
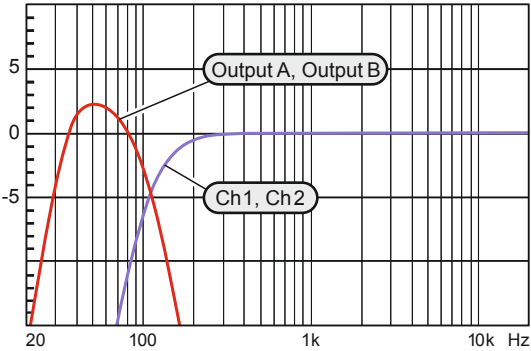
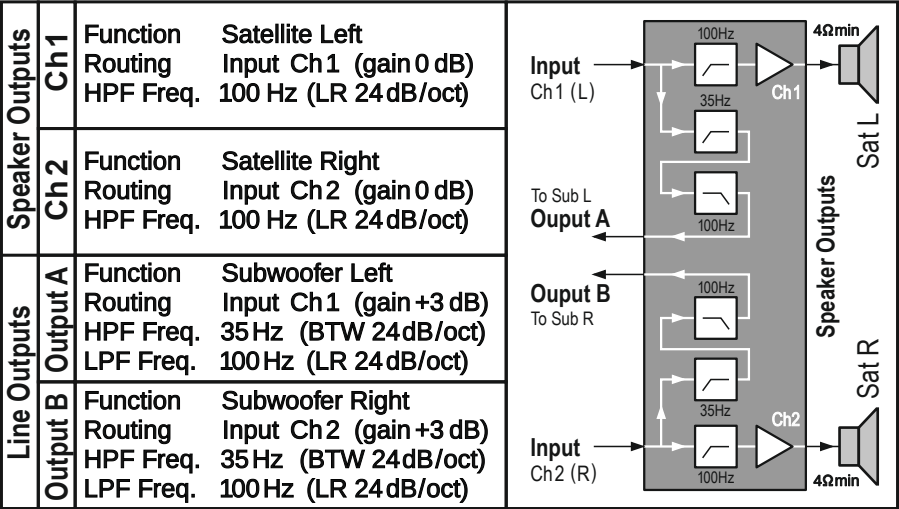
Speaker Outputs	
Ch1	Function Subwoofer Left Routing Input Ch1 (gain +3 dB) HPF Freq. 35 Hz (BTW 24dB/oct) LPF Freq. 100 Hz (LR 24dB/oct)
Ch2	Function Subwoofer Right Routing Input Ch2 (gain +3 dB) HPF Freq. 35 Hz (BTW 24dB/oct) LPF Freq. 100 Hz (LR 24dB/oct)

Line Outputs	
Output A	Function Satellite Left Routing Input Ch1 (gain 0 dB) HPF Freq. 100 Hz (LR 24dB/oct)
Output B	Function Satellite Right Routing Input Ch2 (gain 0 dB) HPF Freq. 100 Hz (LR 24dB/oct)



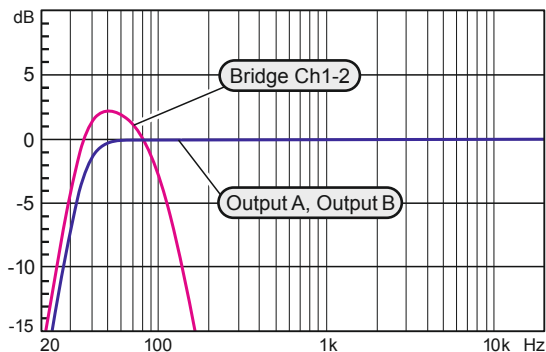
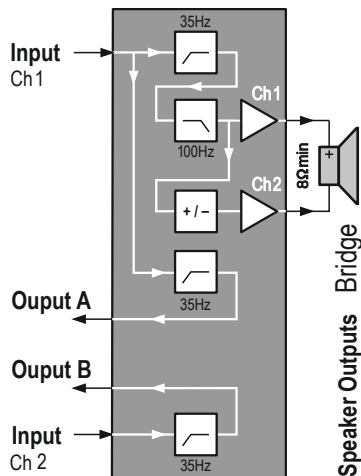


Preset 101 «2 Satellite +2 Subwoofer» (100 Hz)»



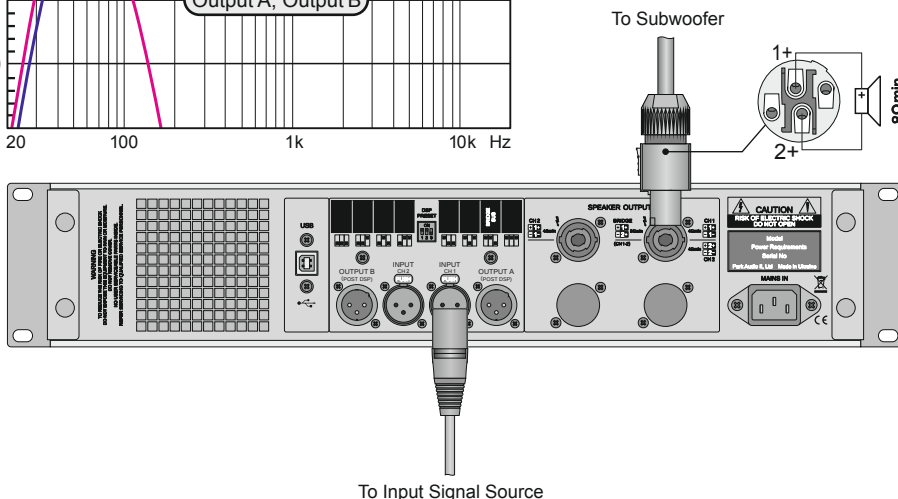
Preset 110 «Bridge Subwoofer»*

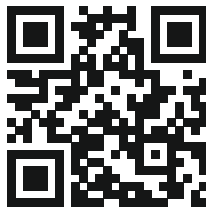
Speaker Outputs	Ch 1	Function Bridge Subwoofer Routing Input Ch 1 (gain +3 dB) HPF Freq. 35 Hz (BTW 24dB/oct) LPF Freq. 100 Hz (LR 24 dB/oct)
	Ch 2	
Line Outputs	Output A	Function Full Range Routing Input Ch 1 (gain 0dB) HPF Freq. 35 Hz (BTW 24dB/oct)
	Output B	Function Full Range Routing Input Ch 2 (gain 0dB) HPF Freq. 35 Hz (BTW 24dB/oct)



Note.

* For amplifier **DF3200 DSP** preset 110 matches preset 100 (no BRIDGE mode in **DF3200 DSP**).





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