DF-series

FOUR-CHANNEL

PROFESSIONAL POWER AMPLIFIER

DF1408 MkII

OWNER'S MANUAL

ACCESSORIES:

1. Power cord
2. Owner’s Manual
3. Warranty

AVIS

RISQUE DE CHOC ELECTRIQUE
NE PAS OUVRIR

CAUTION! *The amplifier runs on 230 V 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 230 V 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

The **DF1408MkII** professional digital four-channel amplifier is designed for high fidelity amplification of sound signals within a professional sound reproduction system. The amplifier can be operated in a four-channel mode, three-channel mode (one pair of channels bridged) or two-channel mode (both pairs of channels bridged).

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 need them for re-shipment 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"). Physically, the amplifier consists of:

- power supply unit;
- four digital amplifying units installed on a common heat sink;
- input unit;
- indication and input level control unit.

Power Supply Unit

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

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 backwards. 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.

Input Filter

To improve the performance of loudspeakers, the amplifier incorporates a switch-selectable high-pass 4-th order filter with 24 dB per octave slope rate. This is the filter recommended by all major loudspeakers manufacturers. This filter cuts off any signals below 45 Hz, which generally cannot be reproduced by most of the professional loudspeakers.

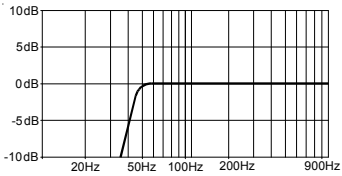
The filter significantly reduces the travel of the LF speaker cone below the loudspeaker frequency cut-off point (which is especially good for bass reflex loudspeakers) thus

making it possible to increase the power applied to the LF speaker without any danger of its overheating. The power of the amplifier is not wasted for cone flapping and allows the loudspeaker to achieve higher sound pressure.

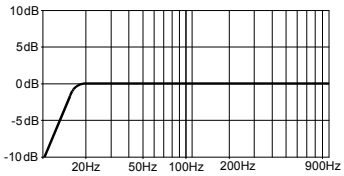
When it is necessary to achieve a linear frequency response to drive full-range loudspeakers generally used in studios or in cinema theatres, the input filter can be disabled (bypassed for each channel individually) with the slide switches located on the amplifier rear panel.

Below see the enabled and disabled filter low frequency response diagrams.

Low Frequency Response for Enabled and Disabled Input Filter



«ON (45Hz)»



«OFF»

Built-in Two-Way Crossover

This feature is to save your money and effort when driving two-way loudspeakers. The bandwidth (high, low, full range signal) is selected individually for each channel with a slide switch. The crossover frequency point is factory preset (generally to 150 Hz). However, it can be changed by replacing the crossover PCB. If you need to change the setting, please, consult our local dealer or the manufacturer's support service by e-mail: support@parkaudio2.com

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.

Optoelectronic Clip-Limiter

The clip-limiter is to reduce the input signal level as soon as any emergency or overload occurs to prevent any sound distortion.

Removable 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.

High Frequency Protection

Should any powerful high frequency fluctuations occur on the output either as a result of poor contact in the input cable connectors, or being transmitted to the amplifier's input by any other device (such as a crossover or mixing console), the protection system activates the built-in optoelectronic Clip-limiter to reduce the input signal level. Thus the protection system effectively prevents any damage to tweeters as might be caused by non-musical signals of powerful high frequency spectrum.

Thermal Protection

The continuous-operation-support protection system is common for four channels. When the heat sink becomes heated over 50°C, the fan goes into its maximum speed mode (normally, the fan runs at its minimum at a low speed). If the temperature of the heat sink rises further to 65°C, the next stage of the thermal protection system goes active. It is a built-in Clip limiter which reduces the input signal level (for all channels at a time) without distorting the amplified signal. In this case the thermal protection LED becomes slightly lit (dim). The higher the temperature, the lower signal level, the brighter is the LED. Such an algorithm ensures faultless and continuous functioning of the amplifier even in case of overheating.

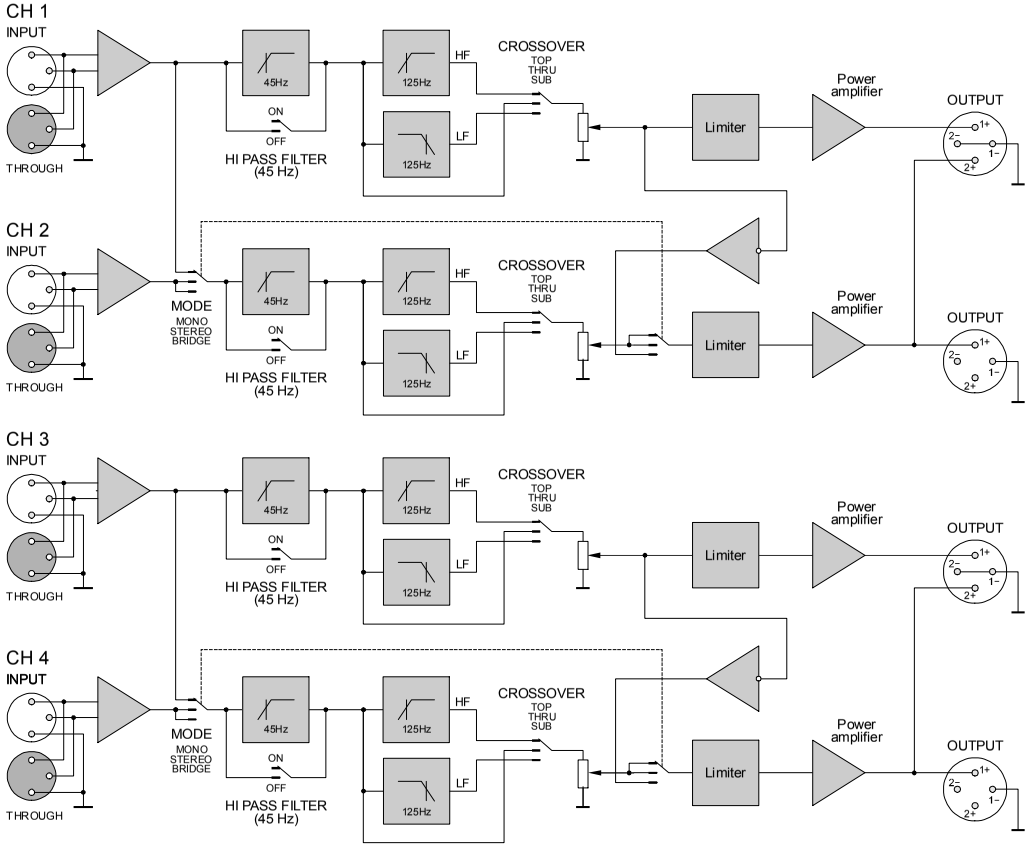
The amplifier may stop functioning only in case of the fan breakdown or blocked air flow. In this case upon reaching 85°C, the independent protection system disables the respective channel of the amplifier. The CLIP LED goes on and the SIGNAL LED of the affected channel goes off. The amplifier resumes its operation in the reverse order.

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

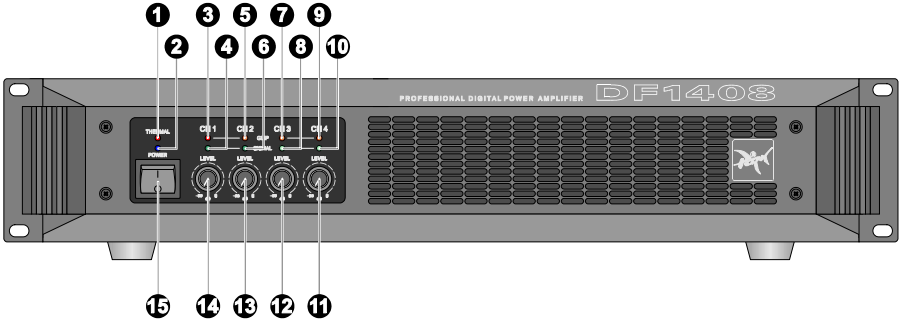
Soft Signal Start

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



❶ **THERMAL** – overheating alarm LED.
Brightness depends on the temperature of the heat sink
(See: *Thermal Protection*).

❷ **POWER** LED.
When the DC output protection system becomes active it goes off irrespective of electric power applied to the amplifier.

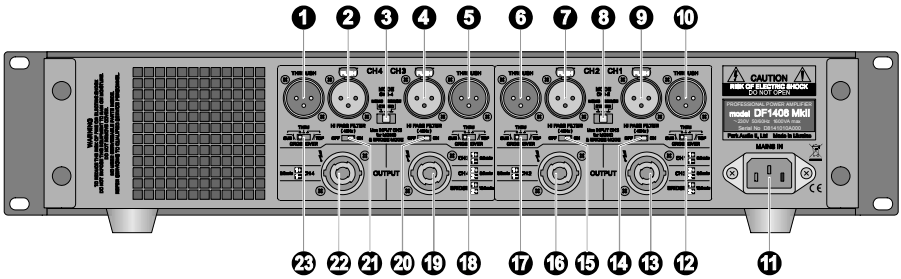
❸❺❼❾ **CLIP** - overload alarm LEDs for Channels 1, 2, 3 and 4, respectively.
They indicate
– overload condition causing distortion and activation of the optoelectronic Clip-limiter of the respective channel;
– activation of thermal protection system which disables the respective channel (the SIGNAL LED goes off). (See: *Thermal Protection*).

❹❻❽❿ **SIGNAL** LEDs indicating output signal on Channels 1, 2, 3 and 4, respectively.

⓫⓬⓭⓮ **LEVEL** - input (sensitivity) level attenuators for Channels 4, 3, 2 and 1, respectively.

⓯ **POWER** switch.

REAR PANEL



❶❺❻❿ **THROUGH** – line outputs for Channels 4, 3, 2 & 1, respectively (XLR male). Are used to deliver input signal along the respective channel to the input of another amplifier.
THROUGH connectors are parallel to INPUT connectors of respective channels.

❷❹❼❾ **NPUT** – balanced inputs (XLR female) Channels 4, 3, 2 and 1, respectively. Inputs for Channels 1 and 3 are also used to supply the input signal for channels 1 & 2 and Channels 3 & 4 functioning in the MONO and BRIDGE mode.

❸ **MODE** switch for channel 3 and 4:
– MONO – Channels 3 and 4 drive two loads from a single input signal source;
– STEREO – Channels 3 and 4 drive two loads from two separate input signal sources;
– BRIDGE – Channels 3 and 4 drive a common load from a single input signal source.

❽ **MODE** switch for Channels 1 and 2:
– MONO – Channels 1 and 2 drive two loads from a single input signal source;
– STEREO – Channels 1 and 2 drive two loads from two separate input signal sources;
– BRIDGE – Channels 1 and 2 drive a common load from a single input signal source.

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

⓬⓱⓲㉓ **CROSSOVER** switches for Channels 4, 3, 2 and 1, respectively, to select the required frequency band:
– TOP – higher frequency signal component;
– SUB – lower frequency signal component;
– THRU (Full Range).
Switches for Channels 1 and 3 are also used to select the required frequency band for Channels 1 & 2 and Channels 3 & 4 functioning in the BRIDGE mode.

⓭⓰㉑㉒ **OUTPUT** – output SPEAKONs for Channels 1, 2, 3 and 4, respectively, used to connect to loudspeakes.
To connect loudspeakers to Channels 1 & 2 and 3 & 4 functioning in the BRIDGE mode, use outputs for Channels 1 and 3, respectively.
In addition, Channel 1 output connector is interlinked with Channel 2 output, while Channel 3 output connector with Channel 4 output, thus making it possible to use a single NL4FC connector (wired accordingly) to connect Channel 1 and 2 loudspeakers to channel 1 output connector and Channel 3 and 4 loudspeakers to Channel 3 output connector.

⓮⓯⓴㉑ **HI PASS FILTER** switches for Channels 1, 2, 3 and 4, respectively, used to enable/disable (bypass) the input filter for each channel individually.

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 Ohm Load	8 Ohm Load
0.50 mm^2	0.72 Ohm	15.4 %	8.3 %
0.75 mm^2	0.49 Ohm	10.9 %	5.8 %
1.00 mm^2	0.36 Ohm	8.3 %	4.3 %
1.50 mm^2	0.24 Ohm	5.7 %	2.9 %
2.00 mm^2	0.18 Ohm	4.3 %	2,2 %
2.50 mm^2	0.15 Ohm	3.6 %	1.8 %
4.00 mm^2	0.09 Ohm	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-mm^2 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.

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 V AC 50/60 Hz. In the event of line voltage sag, the unit will continue to operate normally, albeit with less power. The mains lower voltage limit for the amplifier to retain its operability is 160V.

The actual AC current consumption depends on the audio signal level and the load impedance. While installing a sound reinforcement system, it should be taken into account that the average rate of current consumption by the amplifier when reproducing standard musical material at the maximum level is as follows:

– 1,.5 A into 16 Ohms (for all channels);

– 3 A into 8 Ohms (for all channels).

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

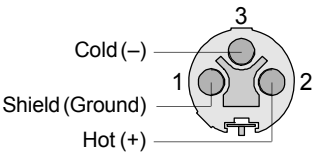
INPUT AND OUTPUT CONNECTORS

Input Connectors

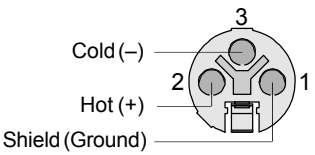
Use **XLR** (male) connectors to connect to the amplifier inputs and **XLR** (female) connectors to line outputs.

See the wiring on the figures below.

XLR male



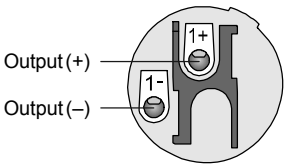
XLR female



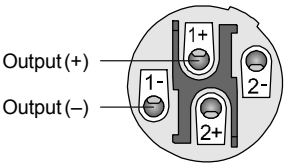
Output Connectors

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**.

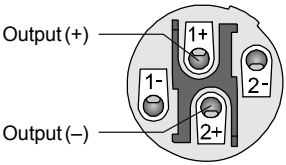
See the wiring on the figures below.



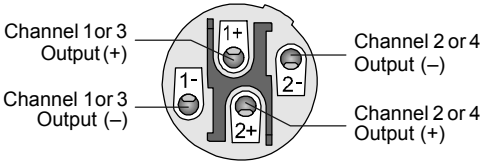
NL2FC for individual channel mode



NL4FC for individual channel mode



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



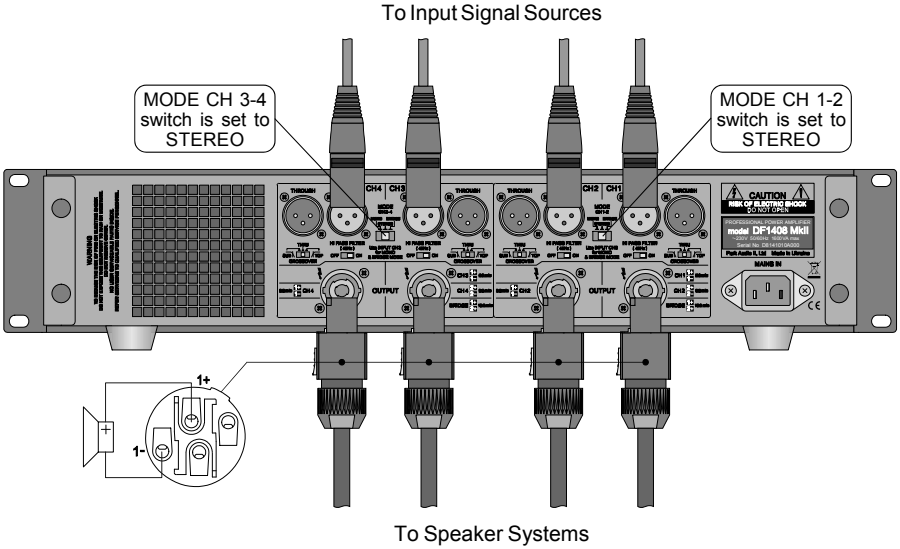
NL4FC for linking up two channels with a single connector
(only for Channels 1 & 3 connectors)

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

OPERATING MODES

Four-Channel Mode for Four Individual Signal Sources

STEREO mode is used for both pairs of the channels.



Link up an input signal to each individual channel.

Connect a loudspeaker to each channel output with a SPEAKON NL2FC or NL4FC connector.*

Set the MODE switches for Channels 1 & 2 and Channels 3 & 4 to STEREO.

Adjust the input signal level for each channel individually with the LEVEL attenuators on the front panel.

Set the CROSSOVER switch of each individual channel to the required position.

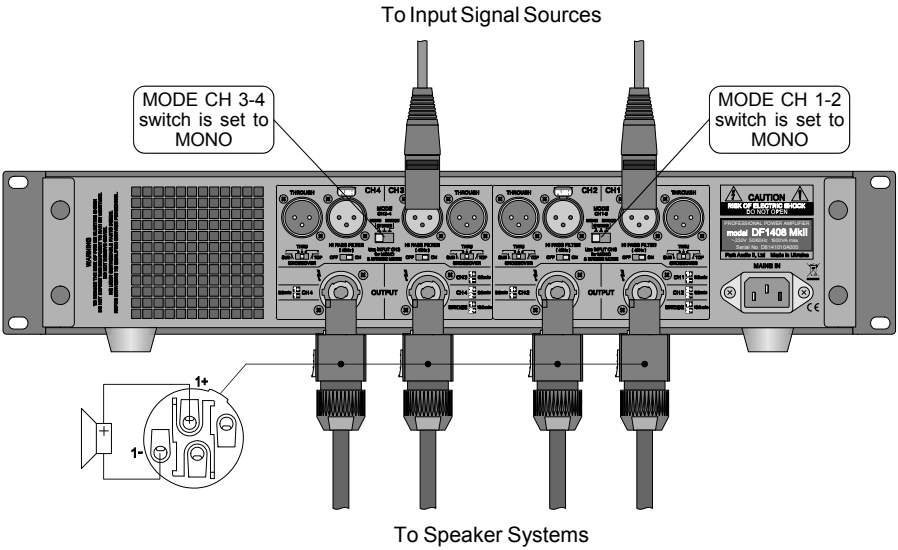
Generally, it is recommended to set the input HI PASS FILTER switches to 45 Hz. However, when it is necessary to obtain a linear frequency response to drive full-range systems used in studios or cinema theatres, set them to OFF. See: Input Filter.

Note.

* The loudspeaker rated impedance should be at least 8 Ohms.
Never attempt to jumper or otherwise link up any pins of SPEAKON output connectors.

Four-Channel Mode for Two Signal Sources

MONO mode is used for both pairs of the channels.



Apply an input signal to the inputs of Channels 1 and 3.

Connect a loudspeaker to each channel output with a SPEAKON NL2FC or NL4FC connector.*

Set the MODE switches for Channels 1 & 2 and Channels 3 & 4 to MONO.

Adjust the input signal level for each channel individually with the LEVEL attenuators on the front panel.

Set the CROSSOVER switch of each individual channel to the required position.

Generally, it is recommended to set the input HI PASS FILTER switches to 45 Hz. However, when it is necessary to obtain a linear frequency response to drive full-range systems used in studios or cinema theatres, set them to OFF. See: *Input Filter*.

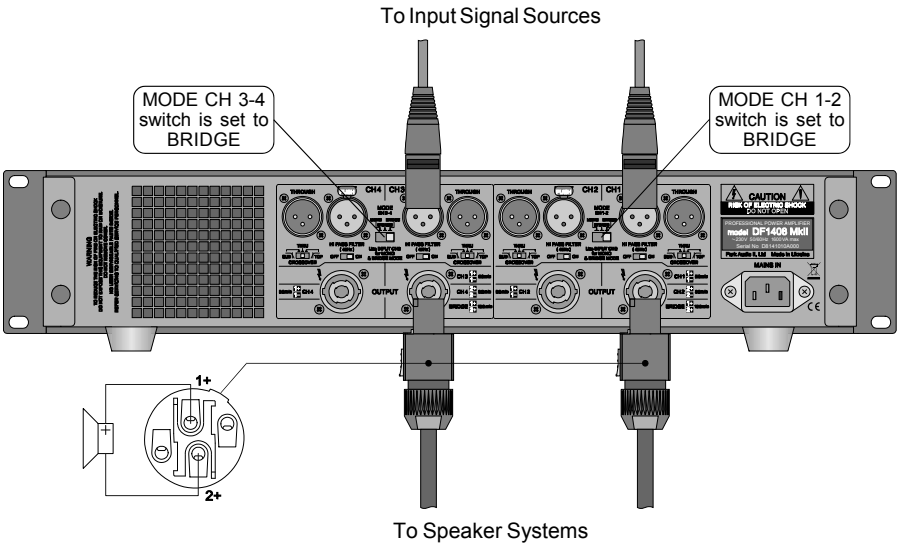
Note.

* The loudspeaker rated impedance should be at least 8 Ohms.

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

Two-Channel Mode

Both pairs of channels are bridged.



Apply an input signal to the inputs of Channels 1and 3.

Connect a loudspeaker to the output of Channels 1 and 3 with a SPEAKON NL4FC connector wired for bridge connection.*

Set the MODE switches for Channels 1 & 2 and Channels 3 & 4 to BRIDGE.

Adjust the input signal level with the LEVEL attenuators for Channels 1 and 3.

Set the CROSSOVER switches of Channels 1 and 3 to the position required for each pair of channels (the crossover switches of Channels 2 and 4 may be in any position).

Generally, it is recommended to set the input HI PASS FILTER switches to 45 Hz (in this case only switches for Channels 1 and 3 are involved). However, when it is necessary to obtain a linear frequency response to drive full-range systems used in studios or cinema theatres, set them to OFF. See: *Input Filter*.

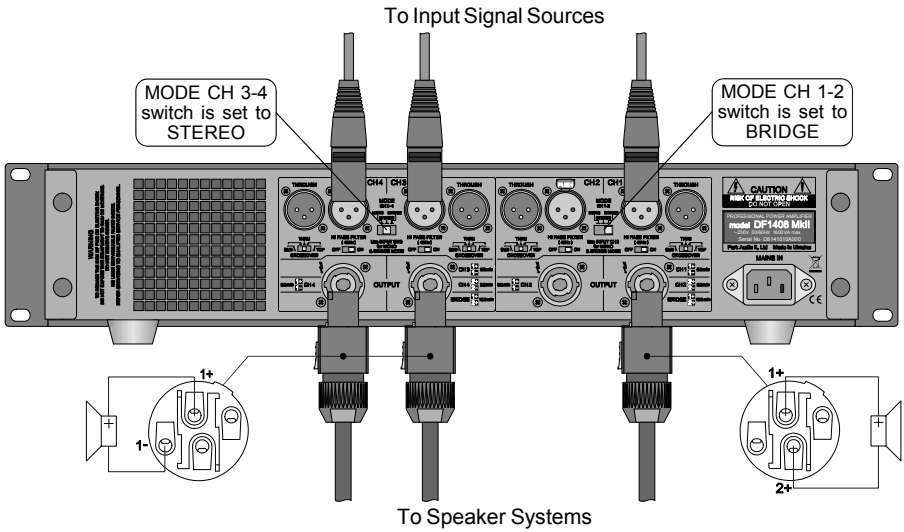
Note.

* The loudspeaker rated impedance should be at least 16 Ohms.

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

Three-Channel Mode (Option 1)

Using the bridge mode for one pair of channels and the individual mode for the other.*



Apply an input signal to the inputs of Channels 1, 3 and 4.

Connect loudspeakers to the output of Channel 1 with a SPEAKON NL4FC connector wired for bridge connection and to the outputs of Channel 3 and 4 with SPEAKON NL2FC or NL4FC connectors wired individual-channel mode. **

Set the MODE switches for Channels 1 & 2 to BRIDGE and for Channels 3 & 4 to STEREO.

Adjust the input signal level with the LEVEL attenuators for Channels 1, 3 and 4.

Set the CROSSOVER switches of Channel 1, 3 and 4 to the required position (the crossover switch of Channel 2 may be in any position).

Generally, it is recommended to set the input HI PASS FILTER switches to 45 Hz (in this case only switches for Channel 1, 3 and 4 are involved). However, when it is necessary to obtain a linear frequency response to drive full-range systems used in studios or cinema theatres, set them to OFF. See: *Input Filter*.

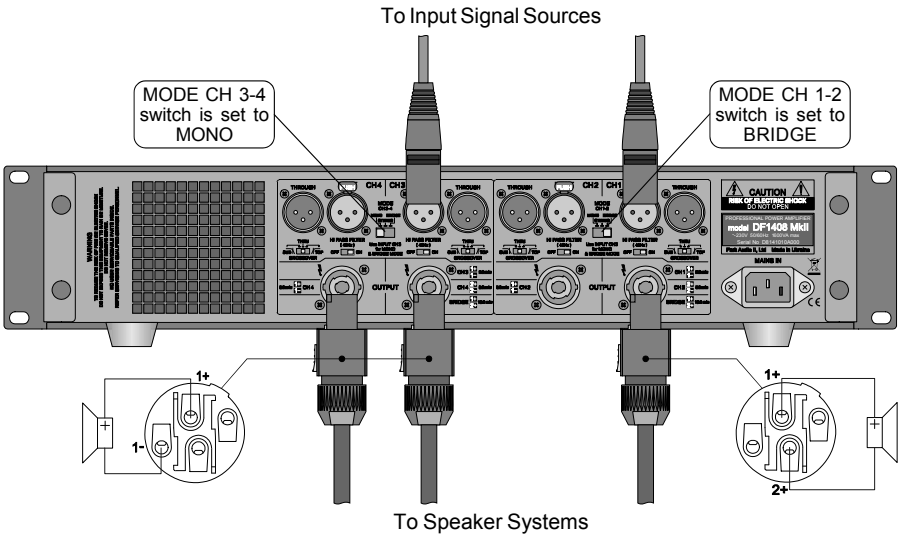
Note.

* Any pair of channels (1 & 2 or 3 & 4) can be operated in the bridge mode or individual mode if properly connected and set up.

** The loudspeaker rated impedance should be at least 8 Ohms for individual connection and 16 Ohms for bridge connection.

Three-Channel Mode (Option 2)

Using the bridge mode for one pair of channels and the individual mode for the other.*



Apply an input signal to the inputs of Channel 1 and 3.

Connect loudspeakers to the output of Channel 1 with a SPEAKON NL4FC connector wired for bridge connection and to the outputs of Channel 3 and 4 with SPEAKON NL2FC or NL4FC connectors wired individual-channel mode. **

Set the MODE switches for Channels 1 & 2 to BRIDGE while for Channels 3 & 4 to MONO.

Adjust the input signal level with the LEVEL attenuators for Channels 1, 3 and 4.

Set the CROSSOVER switches of Channel 1, 3 and 4 to the required position (the crossover switch of Channel 2 may be in any position).

Generally, it is recommended to set the input HI PASS FILTER switches to 45 Hz (in this case only switches for Channel 1, 3 and 4 are involved). However, when it is necessary to obtain a linear frequency response to drive full-range systems used in studios or cinema theatres, set them to OFF. See: *Input Filter*.

Note.

* Any pair of channels (1 & 2 or 3 & 4) can be operated in the bridge mode or individual mode if properly connected and set up.

** The loudspeaker rated impedance should be at least 8 Ohms for individual connection and 16 Ohms for bridge connection.

TROUBLESHOOTING

No Sound Signal on the Amplifier's Output

POWER LED is OFF:

– damaged power cable;

– no power;

– DC protection mode.

But for POWER LED all other LEDs are OFF:

– no input signal;

– input level attenuators are set to minimum position.

SIGNAL and CLIP LEDs are occasionally blinking:

– output cable is short-circuited;

– load impedance is too low.

THERMAL LED and one or several CLIP LEDs are ON while SIGNAL LEDs of these same channels are OFF:

– the respective channels are in the overheating protection mode (the heat sink temperature is over 85°C).

Reduced Output Signal Level

THERMAL LED is slightly lit:

– the unit is protected against overheating (heat sink temperature has exceeded 65°C thus activating the thermal protection system).

Sound Distortion

Only SIGNAL LED is ON:

– applied input signal is distorted before it gets to the amplifier;

– speakers are damaged.

If input level attenuators are set close to their minimum position, distortion may occur as a result of input stage overload with high input signal.

Both SIGNAL and CLIP LEDs are ON:

– overload caused by low load impedance or too high input signal level.

Hum and Interference

Make sure to have the power cord 3-wire plug properly connected to a grounded outlet. Disconnecting the ground contact usually does not eliminate hum and interference but may pose a risk of electric shock.

To reduce hum and noise, use balanced connections.

Interference can also be caused by lighting intensity controls (dimmers), as well as by neon or luminescent tubes.

SPECIFICATIONS

Output Power:	**350 W** (channel into 8 Ohm, ~230 V) **700 W** (bridge into 16 Ohm, ~230 V)*
Peak Output Power:	**420 W** (channel into 8 Ohm, 10 ms, ~230 V) **840 W** (bridge into 16 Ohm, 10 ms, ~230 V)*
Frequency Response:**	**20 Hz – 20 kHz** (±0.5 dB, Pnom.) **10 Hz – 30 kHz** (±1 dB, 1 W)
Total Harmonic Distorsion:	**0.05 %** (20 Hz – 20 kHz)
Slew Rate:	**20 V / µs** (channel) **40 V / µs** (bridge)
Damping Factor:	**over 200** (100 Hz, 8 Ohms)
Channel Separation:	**60 dB** (1 kHz)
Signal-to-Noise Ratio:	**98 dB** (unweighted)
Input Impedance:	**10 kOhm** (balanced)
Sensitivity:	**0.775 V**
Crossover Frequency:	**125 Hz** (basic model)
High-pass Filter Cutoff Frequency:	**45 Hz**
High-Pass Filter Slope Rate:	**24 dB/octave**
Power Requirements:	**230 V, 50/60 Hz**
Weight:	**7 kg**
Dimensions:	**482 mm** (width) **2U** (height in rack) **96 mm** (height) **462 mm** (dept) **321 mm** (depth in rack)

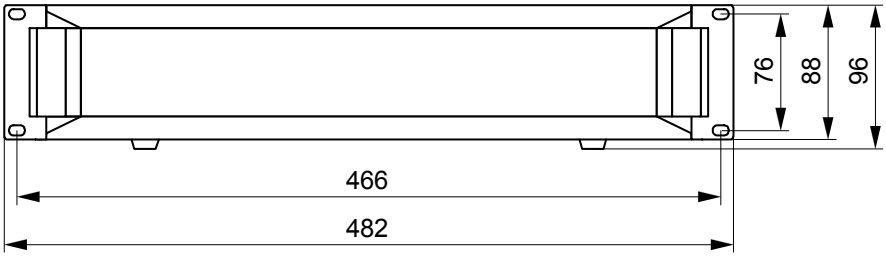
* Bridged channels 1&2 and channels 3&4.

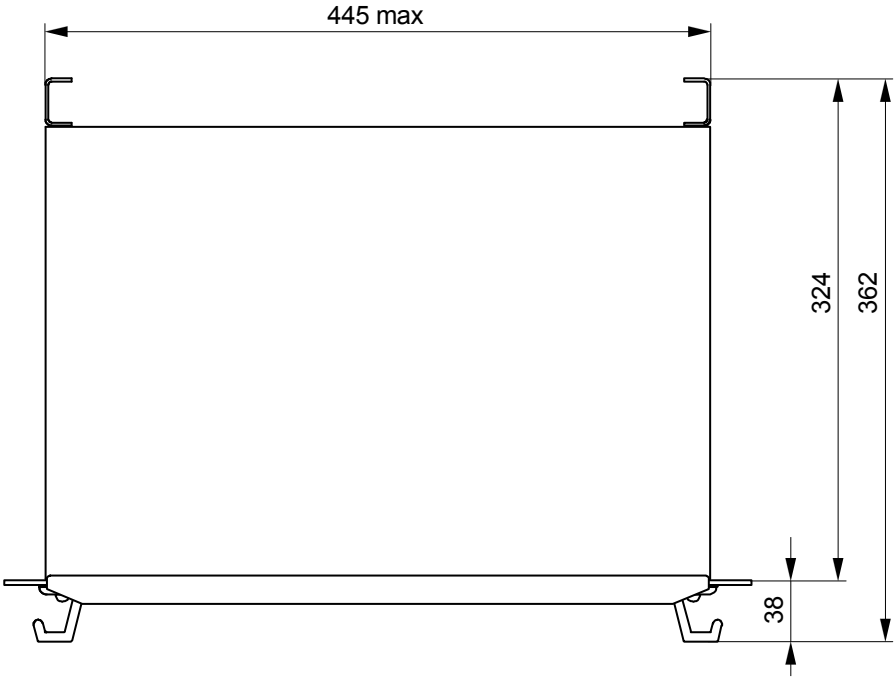
** When cutoff filters are disabled (bypassed).

OPERATING CONDITIONS

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

DIMENSIONS





PARK AUDIO II, Ltd. Vinnytsia, Ukraine
www.parkaudio2.com
e-mail: park@parkaudio2.com

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