



**CONCERT  
SOUND**

***FIRNET™***  
***LINEAR PHASE FIR CONTROLLER***

***MANUAL 1.1***

## IMPORTANT SAFETY INSTRUCTIONS

Before connecting, read instructions

- Read all of these instructions!
- Save these instructions for later use!
- Follow all warnings and instructions marked on the product!
- Do not use this product near water, i.e. bathtub, sink, swimming pool, wet basement, etc.
- Do not place this product on an unstable cart, stand or table. The product may fall, causing serious damage to the product or to persons!
- Slots and openings in the cabinet and the back or bottom are provided for ventilation; to ensure reliable operation of the product and to protect it from overheating, these openings must not be blocked or covered. This product should not be placed in a built-in installation unless proper ventilation is provided.
- This product should not be placed near a source of heat such as a stove, radiator, or another heat producing amplifier.
- Use only the supplied power supply or power cord. If you are not sure of the type of power available, consult your dealer or local power company.
- Do not allow anything to rest on the power cord. Do not locate this product where persons will walk on the cord.
- Never break off the ground pin on the power supply cord.
- Power supply cords should always be handled carefully. Periodically check cords for cuts or sign of stress, especially at the plug and the point where the cord exits the unit.
- The power supply cord should be unplugged when the unit is to be unused for long periods of time.
- If this product is to be mounted in an equipment rack, rear support should be provided.
- This product should be used only with a cart or stand that is recommended by HK AUDIO®.
- Never push objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in risk of fire or electric shock. Never spill liquid of any kind on the product.
- Do not attempt to service this product yourself, as opening or removing covers may expose you to dangerous voltage points or other risks. Refer all servicing to qualified service personnel.
- Clean only with dry cloth.
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for the safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Place the product always in a way that the mains switch is easily accessible.
- Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
  - When the power cord or plug is damaged or frayed.
  - If liquid has been spilled into the product.
  - If the product has been exposed to rain or water.
  - If the product does not operate normally when the operating instructions are followed.
  - If the product has been dropped or the cabinet has been damaged.
  - If the product exhibits a distinct change in performance, indicating a need of service!
- Adjust only these controls that are covered by the operating instructions since improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal operation.
- Exposure to extremely high noise levels may cause a permanent hearing loss.
- Individuals vary considerably in susceptibility to noise induced hearing loss, but nearly everyone will lose some hearing if exposed to sufficiently intense noise for a sufficient time. The U.S. Government's Occupational Safety and Health Administration (OSHA) has specified the following permissible noise level exposures:

Duration Per Day In Hours	Sound Level dBA, Slow Response
8	90
6	92
4	95
3	97
2	100
1 1/2	102
1	105
1/2	110
1/4 or less	115
- According to OSHA, any exposure in excess of the above permissible limits could result in some hearing loss.
- Ear plug protectors in the ear canals or over the ears must be worn when operating this amplification system in order to prevent a permanent hearing loss if exposure is in excess of the limits as set forth above. To ensure against potentially dangerous exposure to high sound pressure levels, it is recommended that all persons exposed to equipment capable of producing high sound pressure levels such as this amplification system be protected by hearing protectors while this unit is in operation.
- Fuses: Replace with IEC 127 (5x 20 mms) type and rated fuse for best performance only.

TO PREVENT THE RISK OF FIRE AND SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO MOISTURE OR RAIN. DO NOT OPEN CASE; NO USER SERVICE-ABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

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## IMPORTANT ADVICE ON SAFETY!

Please read before use and keep for later use!

- The unit has been built by HK AUDIO® in accordance with IEC 60065 and left the factory in safe working order. To maintain this condition and ensure non-risk operation, the user must follow the advice and warning comments found in the operating instructions. The unit conforms to Protection Class 1 (protectively earthed).
- HK AUDIO® ONLY GUARANTEE THE SAFETY, RELIABILITY AND EFFICIENCY OF THE UNIT IF:
  - Assembly, extension, re-adjustment, modifications or repairs are carried out by HK AUDIO® or by persons authorized to do so.
  - The electrical installation of the relevant area complies with the requirements of IEC (ANSI) specifications.
  - The unit is used in accordance with the operating instructions.
  - The unit is regularly checked and tested for electrical safety by a competent technician.
- **WARNING:**
  - If covers are opened or sections of casing are removed, except where this can be done manually, live parts can become exposed.
  - If it is necessary to open the unit this must be insulated from all power sources. Please take this into account before carrying out adjustments, maintenance, repairs and before replacing parts.
  - The appliance can only be insulated from all power sources if the mains connection is unplugged.
  - Adjustment, maintenance and repairs carried out when the unit has been opened and is still live may only be performed by specialist personnel who are authorized by the manufacturer (in accordance with VBG 4) and who are aware of the associated hazards.
  - Loudspeaker outputs which have the IEC 417/5036 symbol (Diagram 1, below) can carry voltages which are hazardous if they are made contact with. Before the unit is switched on, the loudspeaker should therefore only be connected using the lead recommended by the manufacturer.
  - Where possible, all plugs on connection cables must be screwed or locked onto the casing.
  - Replace fuses only with IEC127 type and specified ratings.
  - It is not permitted to use repaired fuses or to short-circuit the fuse holder.
  - Never interrupt the protective conductor connection.
  - Surfaces which are equipped with the "HOT" mark (Diagram 2, below), rear panels or covers with cooling slits, cooling bodies and their covers, as well as tubes and their covers are purposely designed to dissipate high temperatures and should therefore not be touched.
  - High loudspeaker levels can cause permanent hearing damage. You should therefore avoid the direct vicinity of loudspeakers operating at high levels. Wear hearing protection if continuously exposed to high levels.

### MAINS CONNECTION:

- The unit is designed for continuous operation.
- The set operating voltage must match the local mains supply voltage.
- The unit is connected to the mains via the supplied power unit or power cable.
- Power unit: Never use a damaged connection lead. Any damage must be rectified by a competent technician.
- Avoid connection to the mains supply in distributor boxes together with several other power consumers.
- The plug socket for the power supply must be positioned near the unit and must be easily accessible.

### PLACE OF INSTALLATION:

- The unit should stand only on a clean, horizontal working surface.
- The unit must not be exposed to vibrations during operation.
- Place the product always in a way that the mains switch is easily accessible.
- Keep away from moisture and dust where possible.
- Do not place the unit near water, baths, wash basins, kitchen sinks, wet areas, swimming pools or damp rooms. Do not place objects containing liquid on the unit - vases, glasses, bottles etc.
- Ensure that the unit is well ventilated.
- Any ventilation openings must never be blocked or covered. The unit must be positioned at least 20 cm away from walls. The unit may only be fitted in a rack if adequate ventilation is ensured and if the manufacturer's installation instructions are followed.
- Keep away from direct sunlight and the immediate vicinity of heating elements and radiant heaters or similar devices.
- If the unit is suddenly moved from a cold to a warm location, condensation can form inside it. This must be taken into account particularly in the case of tube units. Before switching on, wait until the unit has reached room temperature.
- Accessories: Do not place the unit on an unsteady trolley, stand, tripod, base or table. If the unit falls down, it can cause personal injury and itself become damaged. Use the unit only with the trolley, rack stand, tripod or base recommended by the manufacturer or purchased together with the unit. When setting the unit up, all the manufacturer's instructions must be followed and the setup accessories recommended by the manufacturer must be used. Any combination of unit and stand must be moved carefully. A sudden stop, excessive use of force and uneven floors can cause the combination of unit and stand to tip over.
- Additional equipment: Never use additional equipment which has not been recommended by the manufacturer as this can cause accidents.
- To protect the unit during bad weather or when left unattended for prolonged periods, the mains plug should be disconnected. This prevents the unit being damaged by lightning and power surges in the AC mains supply.

Diagram 1



Diagram 2



## WICHTIGE SICHERHEITSHINWEISE!

Bitte vor Gebrauch lesen und für späteren Gebrauch aufbewahren!

- Das Gerät wurde von HK AUDIO® gemäß IEC 60065 gebaut und hat das Werk in sicherheitstechnisch einwandfreiem Zustand verlassen. Um diesen Zustand zu erhalten und einen gefahrlosen Betrieb sicherzustellen, muss der Anwender die Hinweise und die Warnvermerke beachten, die in der Bedienungsanleitung enthalten sind. Das Gerät entspricht der Schutzklasse I (schutzgeerdet).
- DIE SICHERHEIT, ZUVERLÄSSIGKEIT UND LEISTUNG DES GERÄTES WIRD VON HK AUDIO® NUR DANN GEWÄHRLEISTET, WENN:
  - Montage, Erweiterung, Neueinstellung, Änderungen oder Reparaturen von HK AUDIO® oder von dazu ermächtigten Personen ausgeführt werden.
  - die elektrische Installation des betreffenden Raumes den Anforderungen von IEC (ANSI)-Festlegungen entspricht.
  - das Gerät in Übereinstimmung mit der Gebrauchsanweisung verwendet wird.

### WARNUNG:

- Wenn Abdeckungen geöffnet oder Gehäuseeteile entfernt werden, außer wenn dies von Hand möglich ist, können Teile freigelegt werden, die Spannung führen.
- Wenn ein Öffnen des Gerätes erforderlich ist, muss das Gerät von allen Spannungsquellen getrennt sein. Berücksichtigen Sie dies vor dem Abgleich, vor einer Wartung, vor einer Instandsetzung und vor einem Austausch von Teilen.
- Ein Abgleich, eine Wartung oder eine Reparatur am geöffneten Gerät unter Spannung darf nur durch eine vom Hersteller autorisierte Fachkraft (nach VBG 4) geschehen, die mit den verbundenen Gefahren vertraut ist.
- Lautsprecher-Ausgänge, die mit dem IEC 417/5036-Zeichen (Abb.1, s.unten) versehen sind können berührungsfähige Spannungen führen. Deshalb vor dem Einschalten des Gerätes Verbindung nur mit dem vom Hersteller empfohlenen Anschlusskabel zum Lautsprecher herstellen.
- Alle Stecker an Verbindungskabeln müssen mit dem Gehäuse verschraubt oder verriegelt sein, sofern möglich.
- Es dürfen nur Sicherungen vom Typ IEC 127 und der angegebenen Nennstromstärke verwendet werden.
- Eine Verwendung von geflickten Sicherungen oder Kurzschließen des Halters ist unzulässig.
- Niemals die Schutzleiterverbindung unterbrechen.
- Oberflächen, die mit dem "HOT"-Zeichen (Abb.2, s.unten) versehen sind, Rückwände oder Abdeckungen mit Kühlschlitzen, Kühlkörper und deren Abdeckungen, sowie Röhren und deren Abdeckungen können im Betrieb erhöhte Temperaturen annehmen und sollten deshalb nicht berührt werden.
- Hohe Lautstärkepegel können dauernde Gehörschäden verursachen. Vermeiden Sie deshalb die direkte Nähe von Lautsprechern, die mit hohen Pegeln betrieben werden. Verwenden Sie einen Gehörschutz bei dauernder Einwirkung hoher Pegel.

### NETZANSCHLUSS:

- Das Gerät ist für Dauerbetrieb ausgelegt.
- Die eingestellte Betriebsspannung muss mit der örtlichen Netzspannung übereinstimmen.
- Der Anschluss an das Stromnetz erfolgt mit dem mitgelieferten Netzteil oder Netzkabel.
- Netzteil: Eine beschädigte Anschlussleitung kann nicht ersetzt werden. Das Netzteil darf nicht mehr betrieben werden.
- Vermeiden Sie einen Anschluss an das Stromnetz in Verteilerdosen zusammen mit vielen anderen Stromverbrauchern.
- Die Steckdose für die Stromversorgung muss nahe am Gerät angebracht und leicht zugänglich sein.

### AUFSTELLUNGORT:

- Das Gerät sollte nur auf einer sauberen, waagerechten Arbeitsfläche stehen.
- Das Gerät darf während des Betriebs keinen Erschütterungen ausgesetzt sein.
- Feuchtigkeit und Staub sind nach Möglichkeit fernzuhalten.
- Das Gerät muss immer so aufgestellt werden, dass der Netzschalter frei zugänglich ist.
- Das Gerät darf nicht in der Nähe von Wasser, Badewanne, Waschbecken, Küchenspüle, Nassraum, Swimmingpool oder feuchten Räumen betrieben werden. Keine mit Flüssigkeit gefüllten Gegenstände -Vase, Gläser, Flaschen etc. auf das Gerät stellen.
- Sorgen Sie für ausreichende Belüftung der Geräte.
- Eventuelle Ventilationsöffnungen dürfen niemals blockiert oder abgedeckt werden. Das Gerät muss mindestens 20 cm von Wänden entfernt aufgestellt werden. Das Gerät darf nur dann in ein Rack eingebaut werden, wenn für ausreichende Ventilation gesorgt ist und die Einbauanweisungen des Herstellers eingehalten werden.
- Vermeiden Sie direkte Sonneneinstrahlung sowie die unmittelbare Nähe von Heizkörpern und Heizstrahlern oder ähnlicher Geräte.
- Wenn das Gerät plötzlich von einem kalten an einen warmen Ort gebracht wird, kann sich im Geräterinnern Kondensfeuchtigkeit bilden. Dies ist insbesondere bei Röhrengeräten zu beachten. Vor dem Einschalten solange warten bis das Gerät Raumtemperatur angenommen hat.
- Zubehör: Das Gerät nicht auf einen instabilen Wagen, Ständer, Dreifuß, Untersatz oder Tisch stellen. Wenn das Gerät herunterfällt, kann es Personenschäden verursachen und selbst beschädigt werden. Verwenden Sie das Gerät nur mit einem vom Hersteller empfohlenen oder zusammen mit dem Gerät verkauften Wagen, Rack, Ständer, Dreifuß oder Untersatz. Bei der Aufstellung des Gerätes müssen die Anweisungen des Herstellers befolgt und muss das vom Hersteller empfohlene Aufstellzubehör verwendet werden. Eine Kombination aus Gerät und Gestell muss vorsichtig bewegt werden. Plötzliches Anhalten, übermäßige Kraftanwendung und ungleichmäßige Böden können das Umkippen der Kombination aus Gerät und Gestell bewirken.
- Zusatzvorrichtungen: Verwenden Sie niemals Zusatzvorrichtungen, die nicht vom Hersteller empfohlen wurden, weil dadurch Unfälle verursacht werden können
- Zum Schutz des Gerätes bei Gewitter oder wenn es längere Zeit nicht beaufichtigt oder benutzt wird, sollte der Netzstecker gezogen werden. Dies verhindert Schäden am Gerät aufgrund von Blitzschlag und Spannungstößen im Wechselstromnetz.

Abb.1



Abb.2



# FIRNET™

## LINEAR PHASE FIR CONTROLLER



### CONGRATULATIONS!

You made an excellent choice by opting for the HK AUDIO FIRNET Linear Phase Controller.

The HK AUDIO engineers who developed the FIRNET controller dipped into a deep well of more than ten years experience working with FIR filtering technology, developing state-of-art AD/DA converters, and programming digital signal processors. Designed to handle with the greatest ease, this device helps you efficiently distribute and process audio signals to achieve excellent audio results with our speaker systems.

Please read this manual carefully; your time will be well-spent as this information will help you make the most of the device and its performance potential.

This manual describes the FIRNET controller's functions in great detail. If you are knowledgeable of and experienced with this type of controller and simply need a quick introduction to the front panel and its functions, you may wish to consult the Quick Start Guide on page 6.

### IMPORTANT NOTES ON SAFETY

Please read carefully the following instructions and safety guidelines, and keep them safe for later reference. Be sure to heed all the cautionary notes and follow the instructions.

- Do not remove covers; there are no user-serviceable parts inside. Please refer all servicing and maintenance to qualified service personnel.
- Ensure this device is grounded.
- Position the mains cord so it cannot be stepped on or pinched, particularly at the plug end, at power outlets, and at the point it exits the device.
- Use this device only with attachments and accessories specified by the manufacturer.
- This device must be serviced if damaged in any way, for example, if the mains cord or plug is damaged, liquids are spilled or objects dropped into the device, or if it is exposed to rain or moisture, dropped, or fails to operate normally.

This is to certify that

### HK Audio FirNet™

complies with the provisions of the Directive of the Council of the European Communities on the approximation of the laws of the Member States relating to electromagnetic compatibility according to EMC directive 2004/108/EC and low voltage directive 2006/95/EC.

This declaration of conformity of the European Communities is the result of an examination carried out by the Quality Assurance Department of STAMER GmbH in accordance with European Standards EN61000-6-1, EN61000-6-2, and EN 60065 for low voltage.



Magdeburger Str. 8, 66606 St. Wendel

Lothar Stamer Dipl.Ing.  
Managing Director  
St. Wendel, 08/08/2008

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## 1 PURPOSE

The FIRNET controller performs digitally all functions required to address, control, and remote-control HK AUDIO sound reinforcement systems, that is, speakers and amps. Featuring advanced AD and DA converter technology and an internal sampling rate of 96 kHz, it is a premium-quality audio signal processing tool.

## 2 QUICK START GUIDE

### Display

The LCD shows information on presets and parameters. The default readout appears after the device is powered up, and then the display indicates current speaker selection settings and the LAN status. Once you begin navigating adjustable parameters, it shows values pertaining to these parameters.

### Menu Keys

Menu keys (Speaker, Level, Scene, Delay/Phase und Admin) serve to access the various parameter sections. You can adjust the indicated parameters and save these settings using the edit select keys (cursors and back key) for the selected input and output. Pressing the back key always takes you to the next higher menu level.

**Note:** The device retains stored values even if a power failure occurs or it is unplugged from the mains supply.

### Channel Mute

- Using Channel Mute Shortcuts to Mute Outputs A/B/C/D

You can use combinations of the Admin menu key and the four other menu keys (Speaker, Scene, Level, Delay/Phase) to mute the FIRNET's output channels in A/B/C/D sequence. For example, if you wish to mute output A, press Admin + Speaker; to mute output D, press Admin + Delay/Phase. Press the same combination again to reactivate the output.

**Note:** Each of the output channels' red signal LEDs show the given output's mute status (constant red = MUTE).

## 3 GENERAL FEATURES

- FIR filters ensure phase accuracy and strikingly natural-sounding response.
- Top-drawer converter technology provides outstanding dynamic range up to 130 dB (A/D)
- Sophisticated limiters feature an advanced design.
- 96-kHz internal sampling rate delivers highest resolution and transparency.
- Ethernet ports serve to network devices.
- Ethersound, CobraNet, and other interfaces may be retrofitted.
- GPIO interface on board.
- LIPAN PC software enables remote monitoring.

### 3.1 FIR

FIR (Finite Impulse Response) filtering technology provides total phase linearity across all components (speakers, controllers, amps), enabling you to equalize a sound systems' frequency response and phase (or group delay) separately. Thus the system renders the different frequency ranges of a sonic image coherently; that is, in time and faithfully. Differences in phase response no longer cause listening fatigue, dramatically improving transparency and three-dimensional imaging.

Unlike IIR (Infinite Impulse Response) filters, FIR filters do not consist of a specific number of separately computed filter elements. Instead, they contain a complete sampled copy, with the magnitude and phase function required for equalization. The FIR filters in the FIRNET controller equalize all components of the HK AUDIO sound reinforcement systems, including the speaker chassis, speaker enclosures, passive crossovers, power amps, and the controller itself.

Earlier FIR controllers suffered the drawback of high latency. The FIRNET controller for the first time exploits the benefits of FIR filters at the low latency previously confined to conventional IIR controllers. This means you can even use FIR technology for monitoring applications, where it delivers far more gain before feedback.

Optimized IIR filters are used to achieve very low latency no higher than 5.8 ms, including FIR filtering.

### 3.2 STATE-OF-THE-ART DIGITAL CONVERTERS

The FIRNET controller sports a high-end digital converter and audio DSPs usually found in reference-class studio gear. They deliver excellent sound quality and dynamic response, with a dynamic range up to 130 dB (A/D).

### 3.3 SOPHISTICATED LIMITERS

Limiters must protect speakers without squeezing the life out of the sonic image. All the FIRNET controller's outputs are equipped with peak and RMS limiters. The peak limiters look ahead to anticipate amps' output power. In case of an eminent overload, they attenuate this output to levels the speaker systems are rated to handle.

The sophisticated combination of look-ahead (2-ms) peak limiters and RMS limiters with discretely adjusted threshold, attack, hold, and release times ensure the system operates safely.

**Note:** Adjust the following settings to ensure the FIRNET operates properly with the given power amps:

When using FP10000Q amps:

Gain LAB: + 26 dBu

Max D/A Level FIRNET (Admin view): + 18 dBu

When using VX 2400 amps:

Gain VX: + 35 dBu

Max A/D level FIRNET (Admin view): +6 dBu

### 3.4 NETWORK ENABLED

The FIRNET controller ships with Ethernet interfaces (cross-connected signal input (X) and parallel input (II) on the back of the device), and integrates into a LAN via TCP/IP.

### 3.5 WIRELESS FREEDOM

A wireless network access point enables wireless communication at live events. You can send every adjustment made on a laptop or tablet PC direct to the controllers across a wireless network from any point in the auditorium.

### 3.6 GPIO/OPTION SLOT – READY FOR VARIOUS EXTENSIONS

The GPIO interface provides a universal connection that could, for example, link with the house system's control unit. The Option slot accepts future extension hardware such as CobraNet ports and Ethersound interfaces, ensuring your investment in FIRNET yields long-term returns on your investment.

## 4 LIPAN PC SOFTWARE FOR REMOTE CONTROL AND MONITORING



### 4.1 FUNDAMENTALS

FIRNET LIPAN software runs on WIN XP and enables you to remotely monitor and control anything from a single controller to an audio network comprising up to 100 devices, and all this with remarkable clarity and convenience. It handles so intuitively that you'll be able to achieve great results the first time out! The standard Ethernet X and II ports on the rear panel let you connect several FIRNET controllers to remotely control and monitor entire networks. For details on network cable connections, see chapter 6.3, „Rear Panel, PC Ethernet Control Ports.“

With a connected PC running LIPAN software, you can then remote-control this network; that is, monitor all parameters set and indicated at the FIRNET and adjust all controller settings at your PC. LIPAN software also performs further convenient functions such as simultaneously manipulating several FIRNET controllers assigned to groups and equalizing the entire system with a fully parametric IIR-EQ for every controller. Read the LIPAN software manual to learn more about what it can do for you.

### 4.2 IP ADDRESS

Every device has a predefined IP address that may be edited at the device. Every controller in the network is identified and addressed individually by its freely assignable name and unique IP address. Controllers are integrated via a LAN or WLAN.

### 4.3 DATABASE OF FILTER SETS FOR SPECIFIC SPEAKERS

The FIRNET features an extendible database archiving functions for equalization, phase correction, and power handling capacity specifications of different HK AUDIO speakers and sound reinforcement systems.

The controller stores up to 100 filters tuned for specific speakers. A simple mouse click adds setups to and removes setups from the filter database. The database lists these speaker-specific filters by their HK AUDIO speaker series names for easy access. All settings may be stored to the PC as a backup, ensuring they remain accessible at any time.

### 4.4 TOTAL CONTROL

The main window provides a clear view of every networked setup, including all connected controllers and configured groups. A simple mouse click in the network view selects any controller or group for editing.

### 4.5 FAST ACCESS

The desktop offers a channel strip view of all the controller's functions called the controller window. A mouse click changes speaker filters, levels, mute and solo groups, and phases in real-time, without a lot of searching and thumbing through operating manuals. The Admin menu clearly lists all parameters such as IP-address, controller name, and audio source, as well as units for temperature, delay, and the like.

### 4.6 GROUPING CONTROLLERS

Several controllers may be grouped in 16 different groups, making it easy to adjust parameters such as levels and delay times collectively. The main window affords a clear view of all routings.

### 4.7 DATABASE OF SCENES FOR SPECIFIC EVENTS

The FIRNET features a database with ten memory slots for setups for specific events called scenes. They are handy tools for recurring events at the same venues because the speed up audio system setup and ensure every event benefits from the same high quality of audio performance.

### 4.8 STEREO CONTROLLER EQ

LIPAN also provides also an IIR stereo EQ with four fully parametric and two multifunctional bands (peak, shelf, and cut) for every controller in the network. They serve to equalize and adapt the system to suit the given venue. You can set up a WLAN link to check settings at different positions in the audience area and adjust them immediately in real time via this online link.



## 5 FRONT - CONTROL READOUTS AND DISPLAYS:

### 1 SPEAKER Key

- Selects a speaker-specific filter set from the FIRNET speaker series database

### 2 SCENE Key

- Loads scenes setups from the FIRNET database and stores them to the database

### 3 LEVEL Key

- Adjusts input and output levels in the range of -60 dB to 12 dB
- Increment = 0.1 dB in the range of 12 dB to -12 dB
- Increment = 0.5 dB below -12 dB

### 4 DELAY/PHASE Key

- Adjusts delay time up to 500 ms for the FIRNET controller's inputs
- Adjusts delay time up to 25 ms for the FIRNET controller's outputs
- Inverts the phase position of the audio signal routed to the FIRNET controller's inputs and outputs

### 5 ADMIN Key

- Locks keys to prevent unauthorized or unintentional handling
- Selects the audio signal input and associated options
- Adjusts peak analog input and output levels to match FIRNET to upstream or downstream audio devices
- Edits the IP address, controller name, and display contrast
- Serves to select the delay unit of measure (ms, m, ft, samples) and enter the surrounding temperature to calculate the speed of sound

### 6 AES IN LED Display

- Lights up blue when the FIRNET controller's digital AES/EBU IN signal input is selected
- Extinguished when the FIRNET's analog signal inputs are selected

### 7 EXT SYNC LED Display

- This LED lights up blue when an external AES/EBU signal is enabled for the FIRNET's synchronization option and the device receives an incoming signal.
- Extinguished when the controller's internal synchronization is selected

### 8 INPUT LED Displays (10 LEDs, green/yellow/red)

- Green segment: Audio input level in the range of -48 to -12 dB at full scale
- Yellow segment: Audio input level in the range of -12 to 0 dB at full scale
- Red segment: Audio input level is overdriving the AD converter

**Note:** An overdriven AD converter generates distortion that the FIRNET's limiter cannot suppress. If the red LED lights up, set the FIRNET's input gain to a higher value (see the section *Setting Peak AD Level in the Adjusting Parameters chapter*) or reduce the source audio device's output level! Be sure to heed the gain level recommendations for connected amps, particularly when operating an FP10000Q power amp.

### 9 LCD

- 2 x 24 characters
- Shows in normal operating mode the controller name, the selected filter, and the existence of a network link
- Shows options and editable parameters when you access a menu

### 10 OUTPUT LED Displays

- (10 LEDs, green/yellow/red)
- Green segment: Audio input level in the range of -48 to -12 dB below the limiter value
- Yellow segment: Audio input level in the range of -12 to 0 dB at below the limiter value
- Red segment: Limiter is attenuating the audio input level. The given output is muted (LED lights up continuously)

### 11 Back Key

- Returns to the next higher menu level
- Exits edit windows without assigning adjusted values
- Adopts unconfirmed parameter changes with Enter

### 12 Navigation Keys

- Navigates to the next or previous menu option
- Selects and changes parameters in the edit windows
- Top key: Arrow up while scrolling in the menus
- Bottom key: Arrow down while scrolling in the menus
- Right key to adjust parameter values (higher numerical values)
- Left key to adjust parameter values (lower numerical values)
- Enter key to confirm the adjusted value

### 13 Reset Button

The FIRNET controller reboots after 10 seconds, and then loads the most recent settings. Unsaved settings are not retained.

### 14 Soft Reset and Hard Reset key combinations

The FIRNET offers two more reset functions:

#### Soft Reset: (Admin+Back+Enter for 3 seconds)

- Loading the default preset Null
- Functions:
- No speaker/ no filter selected
  - No signal routed to the exits
  - All FIR initial coefficients set to 0
  - No filters set; filter must be reloaded!
  - X-Over set to bypass
  - Input/ output gain set to 0
  - Delay parameter set to 0
  - IIR EQs all input gains set to 0,
  - IIR EQs output set to bypass (LIPAN Off) and gain to 0
  - All limiters set to +10dB threshold
  - Admin parameters remain unchanged
  - Outputs 1-4 muted

#### Hard Reset: Factory default

(Speaker+Admin+Back for 3 seconds)

- Functions:
- Filter banks deleted
  - Admin: Keylock deactivated
  - Input assign A/B
  - Analog input source
  - Sample rate 96 kHz
  - Dig Clk Sync: internal
  - Delay unit: ms
  - Temperature: 20°C
  - Display contrast: 15
  - Device name 0
  - Max input: +18 dBu
  - Max. output +6 dBu (setting for VX 2400)
  - IP not reset







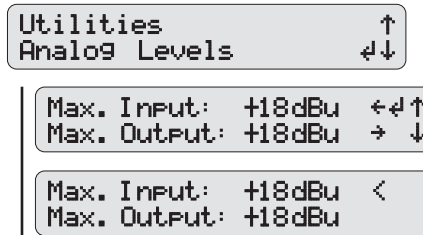
## 6 INPUT A, INPUT B Analog Audio Inputs

Connect signal sources with analog outputs to these three-pin female XLR sockets. Pin assignments are pin 1 = ground, pin 2 = signal (+), pin 3 = signal (-). These electronically balanced ports' input impedance is 9 k-ohms. An electronic filter protects them against HF interference.

A menu option lets you adjust input sensitivity in four steps (6 dBu, 12 dBu, 18 dBu, 24 dBu) to match the FIRNET controller's input to the connected audio device's analog output. Proper matching vastly improves the signal-to-noise ratio at the FIRNET controller's analog input.

To match levels, go to the Admin menu (press ADMIN once), choose the menu option Analog Levels (press down arrow thrice), and then confirm by pressing ENTER.

## Menu option - ADMIN/Analog Levels



The FIRNET uses stacked AD converters to achieve >130 dB (A) input dynamic range.

**Note:** You must manually set analog levels to 18 dBu after a firmware update (see section 7, Analog Signal Outputs).

## 7 OUTPUT A to OUTPUT D Analog Audio Outputs

Use these three-pin XLR male sockets to route output signals to power amps. Pin assignments are pin 1 = ground, pin 2 = signal (+), and pin 3 = signal (-). These electronically balanced connectors' output impedance is 35 ohms. The DA converters' output dynamic range is >124 dB (A). A menu option lets you adjust the maximum output level in four steps (6 dBu, 12 dBu, 18 dBu, 24 dBu) to match the levels of the FIRNET controller's output and the connected power amp's analog input.

**Note:** Adjust the following settings to ensure the FIRNET operates properly with the given power amps:

When using FP10000Q amps:

Gain LAB: + 26 dBu

Max D/A Level FIRNET (Admin view): + 18 dBu






When using VX 2400 amps:

Gain VX: + 35 dBu

Max A/D level FIRNET (Admin view): +6 dBu

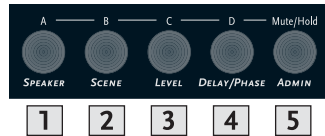
## 7. MENU OPTIONS

### 7.1 A GENERAL SURVEY OF MENU OPTIONS

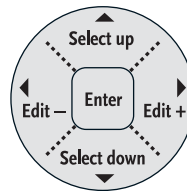
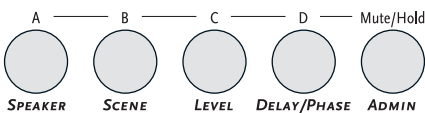
 SPEAKER	 SCENE	 LEVEL	 DELAY/PHASE	 ADMIN
Select Speaker Series Select Filter	Load scene Save Scene	<b>Input Level</b> Input Level A/B <b>Output Level</b> Output Level A/B/C/D	<b>Delay</b> Delay Input A/B Delay Output A/B/C/D <b>Phase</b> Input Phase Phase In A/B Output Phase Phase Out A/B/C/D	<b>Keylock</b> <b>Input Options</b> Input Assign Input Source Sample Rate Dig. Clock source <b>Utilities</b> Delay Unit Temperature Display Contrast Controller Name IP Adress <b>Analog Levels</b> Max. Input Max Output

#### Mute Output A/B/C/D

These control keys serve to mute individual outputs. Simply press and hold the Admin key while pressing key 1 to 4 to select and mute an output.



### 7.2 A GENERAL SURVEY OF CONTROL KEYS



### 7.3 START MENU - VIEWING CURRENT SETTINGS

The device begins booting as soon as it is connected to the mains supply and powered up. The display first reads TEST, and then a < symbol wanders across the display. At the end of the boot sequence, the display indicates the current firmware for about two seconds.

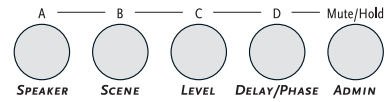
Then the controller's start menu shows the following parameters:

- Preset no.
- Controller name and LAN status
- Current IP address
- Current scene
- Current routing
- Routing input
- Current input
- Current sample rate
- Current synchronization status
- Current firmware version

HK Audio FirNet	
FW: V1.01.0-01010503	
CDR208-06 130Hz	↑
Controller1 LAN	↓
IP: 192.168. 1.105	↑
Filter No 15	↓
I0-Routing Info	↑
InA: AB--, InB: --CD	↓
Input: Analog	↑
Sample Rate: 96kHz	↓
Clock Sync: intern	↑
FW: V1.01.0-01010503	↓

### 7.4 ADJUSTING PARAMETERS

#### Controller Menus



Five menu options are available for editing individual parameters. Simply press the appropriate key to select a menu.

#### 7.4.1 SELECTING SPEAKERS



A quick run-down on how to select the speaker series and the right filter for the connected speaker(s) follows.

Select Speaker Series ↑↓	Select Filter ↓
Select Speaker Series CHDRA ↓	
Select Speaker Series CHDRA_C ←↓	
Selected Speaker Series CHDRA_C	
Select Speaker Series ↑	Select Filter ←↓
Select Filter CDR208-06 130Hz ←↓	
Select Filter CDR208-06 100Hz ←↓	
Selected Filter CDR208-06 100Hz	

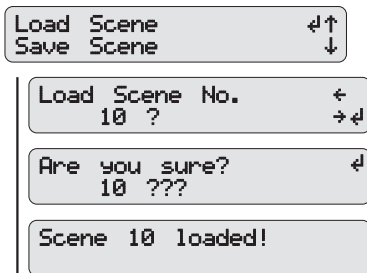
Press the SPEAKER key to select a speaker-specific filter set from the FIRNET's filter database and the ↑↓ keys to choose the menu option Select Speaker Series, if not already selected. Press the ENTER key to go to the Select Speaker Series submenu and the ↓ key to choose an HK AUDIO speaker series. Press the ENTER key to confirm the selected speaker series.

Press the SPEAKER key again and the ↑↓ keys to choose the menu option Select Filter (press the ↓ key once). Press the ENTER key to go to the Select Filter submenu and the ↓ key to select a speaker-specific filter set for the previously selected speaker series. Press the ENTER key to load a selected speaker-specific filter set to the FIRNET controller.

## 7.4.2 SCENES - LOADING AND SAVING PREVIOUSLY STORED SETTINGS

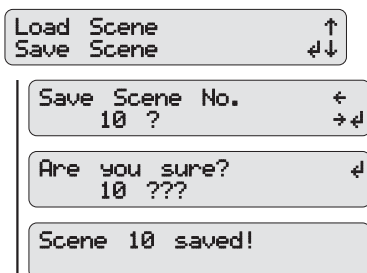


### Load Scene - Accessing Previously Stored Settings



To load previously created and stored scenes, press the SCENE key and then the  $\left[ \uparrow \downarrow \right]$  keys to select the menu option Load Scene, if not already selected. Press the ENTER key to go to the Load Scene submenu and the  $\left[ \leftarrow \rightarrow \right]$  keys to choose the number of the desired scene from 0 to 9. Press the ENTER key to load the selected scene. The LCD will issue a warning reading Different Speaker Series if the selected scene uses speaker-specific filter sets other than those used by the current scene. You must confirm by pressing the ENTER key. A confirmation prompt then appears in the LCD asking Are you sure? Confirm again by pressing the ENTER key. Scene X appears in the LCD indicating the given scene has been loaded.

### Save Scene - Storing Settings as a Scene

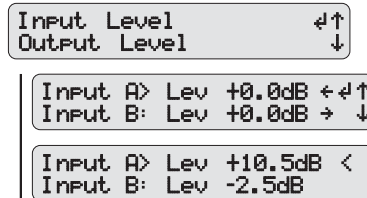


Once you have configured the controller to suit the venue, you can store the FIRNET's current setup as a scene. To do this, press the SCENE key and then the  $\left[ \uparrow \downarrow \right]$  keys to choose the menu option Save Scene (press the  $\downarrow$  key once). Press the ENTER key to go to the Save Scene No submenu and the  $\left[ \leftarrow \rightarrow \right]$  arrow keys to choose a number from 0 to 9 for the memory slot in which you wish to store the scene. Press the ENTER key again to save the scene to the chosen memory slot. A confirmation prompt then appears in the LCD asking Are you sure? Confirm again by pressing the ENTER key. Scene X appears in the LCD indicating you have saved the scene.

## 7.4.3 ADJUSTING LEVELS



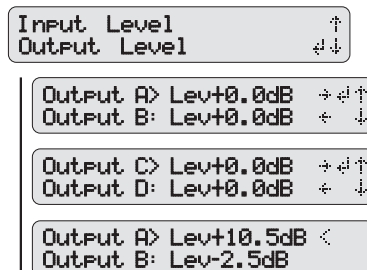
### Adjusting Input Levels



Note: The input level refers to the change in the internal signal processing (post A/D converter), which affects the output levels (or output level indication pre D/A converter).

To adjust the signal levels at the FIRNET's inputs, press the LEVEL key and then the  $\left[ \uparrow \downarrow \right]$  keys to select the menu option Input Level, if not already selected. After pressing the ENTER key, use the  $\left[ \uparrow \downarrow \right]$  keys to select an audio input (Input A or Input B) and the  $\left[ \leftarrow \rightarrow \right]$  keys to set the desired gain for this input. Then press the ENTER key to confirm and assign this level.

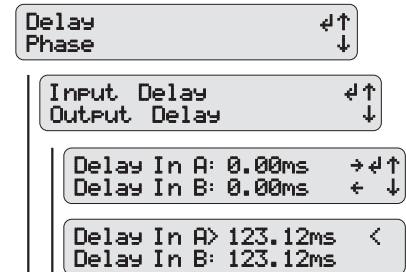
### Adjusting Output Levels



To adjust signal levels at the FIRNET's outputs, press the LEVEL key and then the  $\left[ \uparrow \downarrow \right]$  keys to select the menu option Output Level (press the  $\downarrow$  key once). After pressing the ENTER key, use the arrow  $\left[ \uparrow \downarrow \right]$  keys to select an audio output (Output A to Output D) and the  $\left[ \leftarrow \rightarrow \right]$  keys to set the desired gain for this output. Then press the ENTER key to confirm and assign this level.

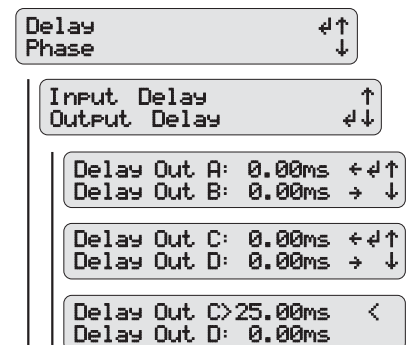
## 7.4.4 DELAY/PHASE

### Adjusting Input Delays



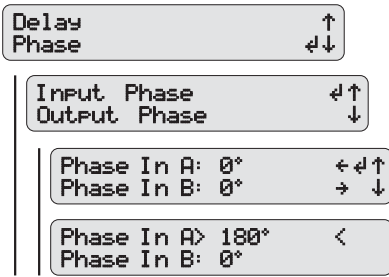
To adjust the delays at the FIRNET's inputs, press the DELAY/PHASE key and then the arrow up and down keys to select the menu option Delay, if not already selected. Press the ENTER key and then the  $\left[ \uparrow \downarrow \right]$  keys to select the menu option Input Delay, if not already selected. After pressing the ENTER key, use the  $\left[ \uparrow \downarrow \right]$  keys to select an audio input (Input A or Input B) and the  $\left[ \leftarrow \rightarrow \right]$  keys to set the desired delay within a range of 0 to 500 ms for this input. Then press the ENTER key to confirm and assign this delay setting.

### Adjusting Output Delays



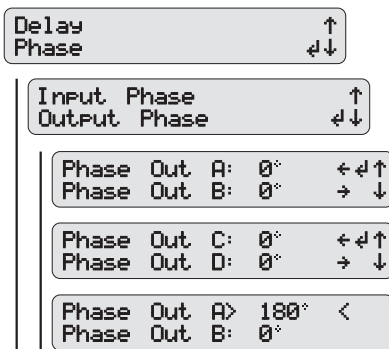
To adjust the delays at the FIRNET's outputs, press the DELAY/PHASE key and then the  $\left[ \uparrow \downarrow \right]$  keys to select the menu option Delay, if not already selected. Press the ENTER key and then the  $\left[ \uparrow \downarrow \right]$  keys to select the menu option Output Delay (press the  $\downarrow$  once). After pressing the ENTER key, use the  $\left[ \uparrow \downarrow \right]$  keys to select an audio output (Output A to Output D) and the  $\left[ \leftarrow \rightarrow \right]$  keys to set the desired delay within a range of 0 to 500 ms for this output. Then press the ENTER key to confirm and assign this delay setting.

**Selecting the Input Phase Position**



The FIRNET lets you set each input’s phase position to 0° or 180° for incoming audio signals. To do this, press the DELAY/PHASE key and then the  $\uparrow/\downarrow$  keys to select the menu option Phase (press the  $\downarrow$  key once). Press the ENTER key and then the  $\uparrow/\downarrow$  keys to select the menu option Input Phase, if not already selected. After pressing the ENTER key, use the  $\uparrow/\downarrow$  keys to select an audio input (Input A or Input B) and the  $\leftarrow/\rightarrow$  keys to select the desired phase position, 0° or 180°, for this input. Then press the ENTER key to confirm and assign this phase position.

**Selecting the Output Phase Position**



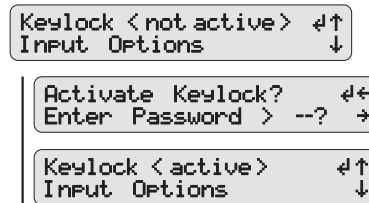
The FIRNET also lets you set each output’s phase position to 0° or 180° for outgoing audio signals. To do this, press the DELAY/PHASE key and then the  $\uparrow/\downarrow$  keys to select the menu option Phase (press the  $\downarrow$  key once). Press the ENTER key and then the  $\uparrow/\downarrow$  keys to select the menu option Output Phase (press the  $\downarrow$  key once). After pressing the ENTER key, use the arrow up and down keys to select an audio output (Output A to Output D) and the  $\leftarrow/\rightarrow$  keys to select the desired phase position, 0° or 180°, for this output. Then press the ENTER key to confirm and assign this phase position.

**7.4.5. ADMIN - ADJUSTING THE REMAINING PARAMETERS**



**7.4.5.1 KEY LOCK – PREVENTING UNAUTHORIZED ACCESS**

**Locking Keys**

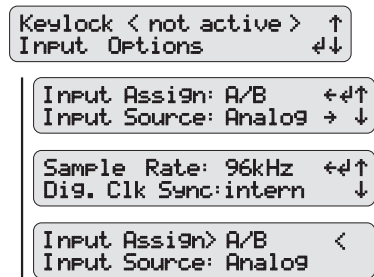


You can lock the FIRNET controller’s keys to prevent unauthorized access and unintentional editing. To lock keys, press the ADMIN key to access the Admin menu. Use the  $\uparrow/\downarrow$  navigation keys to select the menu option Keylock (if not already selected) and press the ENTER key. The LCD now reads Activate Keylock? and prompts you to enter a password (23). Use the  $\leftarrow/\rightarrow$  navigation keys to select the number 23 and press the ENTER key.

**Unlocking Keys**

To unlock keys, press the ADMIN key to access the Admin menu. Keylock is the only menu option available, so simply press the ENTER key to confirm. The LCD now reads Deactivate Keylock? and prompts you to enter a password. Press the ENTER key in the key navigation cross to select the password, which is 23. Enter the password by pressing the  $\leftarrow$  key, and then press the ENTER key to unlock the keys. If you select the wrong password, you will be returned to the Keylock function’s selection menu.

**7.4.5.2 INPUT OPTIONS**



**Input Assign**

- Selecting Separate or Linked Audio Circuits for Inputs A-B

Access the Admin menu by pressing the ADMIN key. Use the arrow keys to select the input menu option Input Options and confirm your selection with ENTER. Select A/B or Link for the menu option Input Assign and confirm your selection by pressing the ENTER key.

**Input Source**

- Selecting an Analog or Digital Input
- Access the Admin menu by pressing the ADMIN key. Use the arrow up and down keys to select the menu option Input Options (press the arrow down key once) and press the ENTER key. Now use the arrow up and down keys to select the submenu option Input Source (press the arrow down key once) and the left and right arrow keys to select an analog (Analog) or digital (AES/EBU) input. Then press the ENTER key to assign the selected input.

**Sampling Rate - Digital Clock Source**

- Setting the sampling frequency and the digital AES/EBU input

When addressing the FIRNET via the digital input, you can choose between two sampling rates, 48 kHz or 96 kHz, for the digital audio signal. The FIRNET always works with an internal sampling rate of 96 kHz. If you patch in a digital audio signal with a 48-kHz sampling rate, the FIRNET converts it to 96 kHz.

## Digital Clock Source

### • Synchronizing Analog Circuits

You can choose between two operating modes when addressing the FIRNET via the analog inputs. The controller may be synchronized to its internal clock or an external clock routed in via the AES/EBU input.

Synchronizing several FIRNET controllers to an external clock ensures individual FIRNET controllers' audio signals remain coherent. This is particularly important for speaker configurations with coherent throw patterns such as line arrays.

To select the clock source, first press the ADMIN key to access the Admin menu. Use the  $\uparrow/\downarrow$  keys to select the menu option Input Options (press the  $\downarrow$  key once) and press the ENTER key.

Now use the  $\uparrow/\downarrow$  keys to select the submenu option Dig. Clk Sync (press  $\uparrow$  once) and the  $\leftarrow/\rightarrow$  keys to set the FIRNET to Internal or AES/EBU. Then press the ENTER key to assign the selected clock. The FIRNET's display shows the selected source.

### 7.4.5.3 UTILITIES: DELAY, TEMPERATURE, DISPLAY CONTRAST, CONTROLLER NAME



### Selecting a Unit of Measure for Delay Readings

The FIRNET indicates delay settings in milliseconds (ms), meters (m), feet (ft), or samples (SA). To select a unit of measure for the delay display reading, first press the ADMIN key to access the Admin menu. Use the  $\uparrow/\downarrow$  keys to select the menu option Utilities (press  $\uparrow$  or  $\downarrow$  twice) and press the ENTER key. Now use the  $\uparrow/\downarrow$  keys to select the submenu option Delay Unit, if not already selected, and the  $\leftarrow/\rightarrow$  keys to select the desired unit for the delay display reading. Then press the ENTER key to assign the selected unit of measure.

To calculate the delay reading for meters (m) and feet (ft), the FIRNET first computes the milliseconds (ms) value based on the speed of sound, which depends on temperature. You must enter the surrounding temperature to the FIRNET to ensure this value is converted correctly. To do this, first press the ADMIN key to access the Admin menu. Use the  $\uparrow/\downarrow$  keys to select the menu option Utilities (press  $\uparrow$  or  $\downarrow$  twice) and press the ENTER key. Now use the  $\uparrow/\downarrow$  keys to select the submenu option Temperature (press the  $\downarrow$  key once) and the  $\leftarrow/\rightarrow$  keys to set the current ambient temperature in °C. Then press the ENTER key to assign this temperature to the equation the FIRNET uses to convert the unit of measure for the delay display reading.

### Adjusting the LCD's Contrast

To adjust the LCD's contrast to the given lighting conditions, first press the ADMIN key to access the Admin menu. Use the  $\uparrow/\downarrow$  keys to select the menu option Utilities (press  $\uparrow$  twice or  $\downarrow$ ) and press the ENTER key. Now use the  $\uparrow/\downarrow$  keys to select the submenu option Display Contrast and the  $\leftarrow/\rightarrow$  keys to select the desired display contrast within a range of 0 to 31. Then press the ENTER key to assign the contrast setting.

### Adjusting Temperature

The FIRNET always stores delay values as samples per ms. It converts the information given at a sampling frequency of 96 kHz and indicates it as delay time in ms. The speed of sound, which varies according to temperature, is a factor in the conversion equation. This is why you must enter the correct air temperature to the FIRNET.

### Selecting the Controller Name

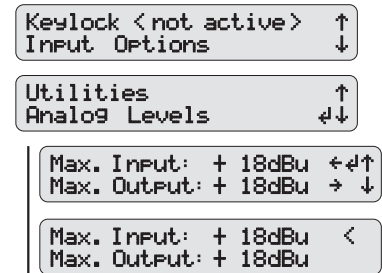
To create an orderly, logical PA setup, you want to establish a clear link between a FIRNET and a speaker or group of speakers. To this end, you can give a controller a meaningful name such as PA Left. To change a controller name, first press the ADMIN key to access the Admin menu. Use the  $\uparrow/\downarrow$  keys to select the menu option Utilities (press  $\uparrow$  or  $\downarrow$  twice) and press the ENTER key. Now use the  $\uparrow/\downarrow$  keys to select the submenu option Contr. Name (press arrow up twice). Use the  $\leftarrow/\rightarrow$  keys to change each letter of the indicated controller name. Press ENTER to go to the next letter in the controller name. Once you have entered the desired controller name, press the ENTER key for about two seconds until a < symbol appears next to the controller name to assign this name.

### Changing the IP Address

The FIRNET ships with a default IP address that reads 192.168.1.100. To change the IP address, first press the ADMIN key to access the Admin menu. Use the  $\uparrow/\downarrow$  keys to select the menu option Utilities (press  $\uparrow$  or  $\downarrow$  twice) and press the ENTER key. Now use the  $\uparrow/\downarrow$  keys to select the submenu option IP Address (press  $\uparrow$  once). Use the  $\leftarrow/\rightarrow$  keys to change each digit of the indicated IP address. Press ENTER to go to the next digit in the IP address. Once you have entered the desired

IP address, press the ENTER key for about two seconds until a < symbol appears next to the IP address. To assign the new IP address, you must power the FIRNET down by severing its connection to the mains supply. The FIRNET will boot with the new IP address the next time you power it up.

### 7.4.5.4 ANALOG LEVELS



### Adjusting the Maximum Input Level (AD)

When addressing the FIRNET via the analog audio inputs, you can adjust input sensitivity in four steps of 6 dBu, 12 dBu, 18 dBu, and 24 dBu to match the FIRNET controller's input to the connected audio device's analog output. The lower the value, the higher the input sensitivity and the higher the input level. To set the maximum level for the AD converter, first press the ADMIN key to access the Admin menu. Use the navigation keys  $\uparrow/\downarrow$  to select the menu option Analog Levels (press  $\uparrow$  once) and press the ENTER key. Now use the navigation keys  $\uparrow/\downarrow$  to select the submenu option Max. Input and set the desired maximum level for the AD converter. Then press the ENTER key to assign the selected maximum level to the AD converter.

**Note:** Professional mixing consoles' output level can range up to +18 dBu, and in some cases even up to +24 dBu. The FIRNET is factory set to +18 dBu. Ensure the input level you have selected in this menu matches as closely as possible the connected audio device's maximum output level.

### Adjusting the Maximum Output Level (DA)

Adjust the FIRNET's analog output signal's maximum level (Max. Output) to match the downstream power amp.

**Heads up:** Correct limiter settings ensure the FIRNET operates safely with the various power amplifiers that drive HK AUDIO loudspeakers. To this end, adjust Max. Output Level settings as follows:

**Menu:** Admin/Utilities/Analog Levels/Max Output Level

**Settings for L.A.B. FP 10000 Q amps:**  
 Gain (L.A.B. FP 10000Q): + 26 dBu  
 Voltage Peak Limiter: 150V, Soft Mode  
 Max Output (Firnet): + 18 dBu

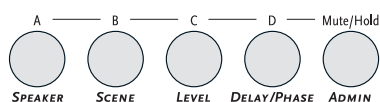
Settings for HK AUDIO VX 2400 amps:

Gain VX 2400: + 35 dBu

Max Output ( Firnet): + 6 dBu

The FIRNET's limiter cannot effectively attenuate signals when set to other dBu levels, so connected speakers may be damaged or destroyed.

#### 7.4.5.5 MUTING OUTPUTS



The SPEAKER, SCENE, LEVEL, DELAY/PHASE and ADMIN keys serve the second purpose of muting outputs. The label above each key tells you its mute function. To mute outputs, press and hold the MUTE/HOLD key and press the key of the output you wish to mute (key A to D for Output A to Output D). The Lim/Mute LED in the given output's LED chain lights up red to indicate the output is muted. Follow the same procedure to enable the output.

#### 7.5 FIRMWARE

The FIRNET controller ships with the current firmware. LIPAN software lets you update the device with future firmware versions. See chapter 4 LIPAN PC Software, to learn more about firmware updates.

## 8 TECHNICAL DATA

### CONNECTORS

Analog Input	3-pin XLR female
Pin assignments	1 = ground, 2 = signal (+), 3 = signal (-)
Input impedance	9 k-ohms
Maximum input level	Variable; 6, 12, 18, and 24 dBu
Dynamic range, input	> 128 dB (A)
Digital input	3-pin XLR female
Pin assignments	1 = ground, 2 = signal, 3 = signal
Input impedance	110 ohms
Protocol	AES 3 (AES/EBU)
Clock rate	48 or 96 kHz, and 96 kHz internal
Synchronization	To an external source (slave mode)
Digital output	3-pin XLR male
Pin assignments	1 = ground, 2 = signal, 3 = signal
Output impedance	110 ohms
Protocol	AES 3 (AES/EBU)
Signal processing	Refresh signal form and level (Bypass at power failure)
Analog outputs	3-pin XLR male
Pin assignments	1 = ground, 2 = signal (+), 3 = signal (-)
Output impedance	35 ohms
Maximum output level	Variable; 6, 12, 18, and 24 dBu
Dynamic range, output	> 125 dB (A)
Mains voltage connector	Three-pole non-heating equipment connector
Mains voltage / frequency	100 to 240 V / 50 - 60 Hz
Power consumption	40 VA
Max. curr. cons. at 100 V mains volt.	400 mA
Max. curr. cons. at 230 V mains volt.	175 mA
Ethernet X port	RJ-45, RJ-45, cross-connected
Ethernet II port	RJ-45, RJ-45, direct-connected

### AUDIO DATA (Linear Through mode)

Frequency response (-1 dB)	5.5 Hz to 34 KHz
THD+N (20 Hz to 20 kHz)	AD>DA input level 21dBu, R=100k, 96 kHz 0.0012%-0.0013% AES>DA input level -3dBFS, R=100k, 96 kHz 0.0010% - 0.0012%
Latency (incl. limiter):	AD > DA 96 KHz 3.15ms AD > AES/EBU 96 KHz AES/EBU > A 96 KHz
+ FIR filter (Cohedra / Coh. Compact)	5.8 ms

### DIGITAL SIGNAL PROCESSING

Internal sampling rate	96 kHz
Internal data format	32-bit floating point
AD converter resolution	28 bits
DA converter resolution	24 bits

### OPERATING CONDITIONS

Temperature range	-10° C to +70°C
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### HARDWARE SPECIFICATIONS

Weight	6.6 lbs. • 3 kg
Measurements (D x H x W)	48 x 4.4 x 23.2 cm 18-7/8 x 17-5/16 x 9-1/8"



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