LinQ
Network Interface

PRELIMINARY

Owner's Manual

Rev 1.4

IMPORTANT SAFETY NOTICES

The triangle with the lightning flash symbol displayed on the unit advises the user of dangerous uninsulated voltage inside the product's enclosure.

To reduce the risk of electric shock, do not remove the cover.

The triangle with the exclamation point symbol on the component suggests that the owner refer to important operating and maintenance instructions in the owner's manual.

Modifications and alterations not approved by the manufacturer may violate adherence to EC regulations and make the appliance no longer suitable for use. The manufacturer declines all responsibility for damage caused to persons or property due to the misuse or malfunction of device subject to unauthorized change.

In order to make changes that improve the already excellent quality of its products, aqua - acoustic quality reserves the right to modify the information or the contents of this manual at any time and without notice.

WARRANTY STATEMENT

Aqua Acoustic Quality (Aqua) equipment is supported, and serviced through the worldwide network of distributors and dealers listed within a section of the website.

The authorized retailer provides the end customer with the dealer's warranty, the terms of which vary according to the country's rules, within European Union generally two (2) or more years.

Warranty service should normally be obtained from the importing distributor or retailer from whom you purchased the product. The authorized importing distributor or retailer accepts the responsibility for the warranty of products sold by that distributor or dealer.

In the unlikely event of service required beyond the capability of the importing distributor or retailer, the customer can contact the manufacturer directly and Aqua will provide the manufacturer's warranty. The manufacturer's warranty for a term of one (1) year from the date the unit was originally shipped from aqua, in order to protect our customers from illegitimate resellers.This manufacturer's warranty is subject to the following terms and conditions:

- in case of a defect covered by this warranty, Aqua will provide without charge the materials and labor necessary to restore the product to its original specifications. In the alternative Aqua may at its sole option either replace the product with a new one of the same or equivalent model in the Aqua production, or refund the purchase price of the product.

The warranty does not apply:

- if the product has not been purchased from an authorized Aqua Dealer

- to damage caused by accident, abuse, misuse or misapplication

- if the product presents changes, modifications or repairs not expressly approved by the manufacturer

- if the Serial Number of the product is absent or altered

- if the product is shipped to Aqua without an adequate package

If vacuum tubes are contained in the product, they are warranted for 90 days from the date of purchase of the original purchaser.

NOS (New Old Stock) components are excluded from the warranty.

The warranty is provided to the original purchaser only, that must provide the original sales receipt containing product name and purchase date. If during the warranty period the product ownership is transferred, the warranty will terminate at the date of the ownership transfer.

The warranty does not cover shipping charges or tax/duty: shipments of the product to Aqua for repair, and shipments to the owner of the serviced product are at the owner's expense

Aqua reserves the right to apply a service charge if the product returned for warranty repair is found to be operating correctly.

Recommended procedure to obtain the repair service (during warranty period and outside)

Contact Aqua, preferably via e-mail at support@aquahifi.com, and briefly describe the problem. In case it is necessary to send the product for repair, Aqua will provide you an RMA number (Return Merchandise Authorization) to return your unit.

This number is required to obtain the repair service: any unit received without an RMA number will be returned to the sender.

The RMA number can be issued only by Aqua staff, you will receive it via e-mail or other means indicated by you.

Please write the RMA number clearly visible on the outside of the package.

THIRD PARTY CONTENT AND TECHNOLOGIES

In its operation, LinQ uses or may use some services or technologies provided by third parties (e.g. streaming services, software applications/libraries and similar).

These services, software applications or products are outside the control of aqua.

Consequently, these services or products are not covered by the warranty. aqua disclaims any liability relating to them, in particular those related to service interruptions or malfunctions of the services/products provided by third parties.

GENERAL SAFETY INFORMATION

The following general safety precautions must be observed during all phases of operation of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the equipment. aqua - acoustic quality assumes no liability for the customer's failure to comply with these requirements.

• DO NOT operate the product in an explosive atmosphere or in the presence of flammable gases or fumes. For continued protection against fire, replace the line fuse(s) only with fuse(s) of the same voltage and current rating and type. DO NOT use repaired fuses or short-circuited fuse holders.

• Keep away from live circuits. Operating personnel must not remove equipment covers or shields. Procedures involving the removal of covers or shields are for use by service-trained personnel only. Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electric shock, DO NOT perform procedures involving cover or shield removal unless you are qualified to do so.

• DO NOT operate damaged equipment. If the built-in safety protection features have been impaired through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use product until safe operation is verified by service-trained personnel. If necessary, return the product to aqua - acoustic quality for service and repair to ensure that the safety features are maintained.

• DO NOT service or adjust alone. Do not attempt any internal service or adjustment unless a person capable of rendering first aid and resuscitation is present.

• DO NOT substitute parts or modify equipment. To avoid the occurrence of additional hazards, do not install substitute parts or perform any unauthorized modification to the product. Return the product to aqua - acoustic quality for service or repair to ensure that the safety features are maintained.

This Guide...

1. **Introduction**

aqua LinQ is a Long-life Network Audio Interface, with special features that make it unique and highly performing.
Connected to your Local Area Network (LAN) Ethernet, the LinQ will allow you to obtain the best sound quality of digital music files in your NAS, server or computer, and from all the main streaming services. Its concept guarantees the possibility of keeping up with the fast evolution of the sector.

2. **Description**

The objective pursued by aqua during the LinQ development is the best possible sound quality, combined with an extreme modularity and flexibility of the architecture.
LinQ is a highly modular device, based on a series of completely independent units.

Each module performs a particular function, for which it is optimized.
Each module has its own dedicated power supply and plugs into a connector on the base platform of the device. In addition to the optimization on the particular function, this architecture guarantees an exceptional possibility of future upgrades.
Every module has its own processor and memory, and also a clock system consisting on two high quality quartz crystal oscillators. This clock is the 'master' clock: due to the fact that network audio is transmitted as data 'packets' that are buffered on the receiver, all the well-known jitter problematics related to the transmission medium are absent. An FPGA is also present on the module board: one of its functions is to make some system optimizations depending on the particular streaming service implemented on the module.

The base platform can accommodate up to four streaming service (protocol) modules, named M1, M2, M3, M4.
Any of them can be positioned in every one of 4 slots.

Two other cards – with a dedicated slot - are always present:
- the unit supervision processor (with a 32- bit ARM microcontroller), that takes care of system operation.
- the LAN switch board, which acts as an internal Ethernet switch resident inside the LinQ.
The LAN switch module, developed ad-hoc, represents a distinctive feature of the unit, and guarantees the best performance in respect of the audio reproduction. All the digital input/output connections on this module are galvanically isolated.
In order to provide the best power supply to each board and to avoid any interference, each module has his own dedicated power-supply circuit.
Outside the base platform, another board has the function to generate the output signals. Here, all the output signals are generated by proprietary circuitry resident into an FPGA (Field Programmable Gate Array). This solution allows high performance and possibility of future upgrade.
Available outputs are: S/PDIF, AES, Dual-AES, and AQlink (I2S) - They are all galvanically isolated from the internal circuitry.

Always having the sound result as an objective, LinQ does not use a USB interface: the output is on AQlink, the aqua I2S proprietary connection. In this way the "passage" on USB is skipped, avoid any losses in sound quality.

3. **Installation**

Please install the LinQ on a stable, vibration-free base.
The unit does not produce significant heat, however avoid to place the unit on top of power amplifiers or other devices emitting heat.
A connection is required to the electrical mains network and to the Ethernet LAN.
The outputs can be connected to a DAC via AQlink (I2S), AES (or Dual/AES), S/PDIF.
Once this is done, the unit is ready for use, no configuration in required.
Before to connect the power cord please check that the voltage required by the unit corresponds to the local main supply. Damages due to wrong mains power are not covered by the warranty.

<center>**NEXTEL COATING**</center>

Be aware that the Nextel coating is not only a nice finishing but it is mostly used as anti-resonant treatment. Take care of it and clean it without the use of chemical products.
<u>Also, we recommend not to put other electronics on top of it, in order to avoid any possible marks and scratches.</u>

Connections:

Input:

- n. 1 standard RJ-45 connector for the ETHERNET network
It must be connected to one of the available sockets of your Network Router or LAN Switch.
No network configuration is required: thanks to the DHCP system the IP address is automatically assigned to the unit. If for some reason you want to know the IP address on your LAN, you can easily check it with the FUNC key (read further: 'System update').

Outputs:

- **AQlink I2S** | n. 1 Ethercon RJ-45 connector (PCM 32 bit 384kHz / DSD128 max). This output is mainly designed for a high-quality connection to La Voce S3, La Scala MkII Optologic and Formula xHD aqua DACs, using the AQqlink I2S type interface. We recommend using an high-performance CAT5, CAT6 or CAT7 cable RJ45 or Neutrik Ethercon terminations (connectors).

- **Dual-AES/EBU** (IEC 60958) | n. 2 XLR 110 ohm connectors (PCM 24 bit 384kHz / DSD128 max). Use two shielded 110 ohm impedance cable for AES/EBU type connections. With the dual-AES output – sometimes named dual-wire AES - it is possible to overcome the 192 kHz limit of the S/PDIF and single AES, enabling the reproduction of musical files up to 384 kHz sampling

frequency. As the names indicates, the transmission is made using two XLR cables, connecting the LinQ and a DAC equipped with this type of input.

When a sampling frequency equal to or greater than 88.2 kHz is detected, the dual-AES output is automatically activated.

Note that the unit inserts on the AES channel status data the appropriate codes defined in the AES/EBU interface standard. In this way a DAC connected to the LinQ output can automatically control the single/dual-AES switching during the reproduction (if the feature is implemented in the DAC).

If the dual-AES is in the activated state, the output signal continues to be present on the S/PDIF connector and on the single AES connector, provided that it does not exceed 192kHz as sampling frequency.

If the dual-AES is in the disabled state, the same signal that is on the single-AES/EBU connector is present also on the two XLR dual-AES connectors.

- **AES/EBU** (IEC 60958-4) | n. 1 XLR 110 ohm connector (PCM 24 bit 192kHz / DSD64 max). Use shielded 110 ohm impedance cable for AES/EBU type connections.

- **S/PDIF** (IEC 60958-1) | n. 1 **BNC** 75 ohm connector (PCM 24 bit 192kHz / DSD64 max). Use a coaxial 75 ohm impedance cable

- **S/PDIF** (IEC 60958-3) | n. 1 **RCA** connector (PCM 24 bit 192kHz / DSD64 max). Use a RCA coaxial cable for digital audio

For all input/output connections we recommend using good quality cables. Pay special attention to the cable connectors.

4. **Operation**

The user interface consists of a six-keys keyboard and a 2x20 characters OLED display.

Keyboard:

Power key: power-on / power-off
When the power is turned on, the word "Testing" is displayed for a short time. Afterwards, the unit automatically activates the module that has been selected before the last shutdown (at power-off, the unit saves the last module selection). When the name of the module appears on the display, the unit is ready to stream music.

Display key: disables / enables the OLED display. If the keyboard is used when the display is in the disabled state, it is re-enabled for a short time.

The **M1, M2, M3, M4** keys are used to select the module you want to listen to: **M1** for the module A, **M2** for the module B, **M3** for the module C and **M4** for the module D

If you have more than one board installed, you can instantly switch to the Module running on the other boars simply pressing the corresponding key.

FUNC key: this key displays at the first and second depression the name and type of the modules currently installed.

Otherwise, holding down this button for some seconds, the firmware release number of the supervision microcontroller and of the currently selected module are displayed.

Display:
The display shows the module currently selected for listening, and indicates also:
- the signal type (PCM / DSD)
- the audio samples bit number (16 / 24)
- the sampling frequency
Note that the displayed data refer to real-time measurements made by the unit, not to values read in the musical files.
Other indications:
'**no LAN**', indicates the absence of network connection
'**no module**': indicated that the user has selected a module that is not present (not installed)

Remote command
An IR RC5 remote control is available on request.
The remote control replicates the font panel keys behaviour.

5. **System update**

It is possible to check the firmware release currently installed on a module using the **FUNC** key (hold on).

Please note that due to the fact that each module is completely independent from the others, each module has to be separately updated.

To access the update function:

- Power on the unit, and select the module (M1, M2, M3 or M4) you want to update.

- Press (hold on) the **Display** key for a few seconds until the update menu appears.

As you can see on the display, there are two ways to perform the LinQ firmware update:

- **Remote mode ('web')**

In order to perform this type of update the unit must the connected to the internet.
Simply press the **M1** key to start the update process.

The procedure lasts some minutes (in general no more than 2-4 min, depending on the internet connection).

At the end, the unit will power-off automatically.

- **Local mode ('loc')**

(*) the local mode has been implemented also to make possible to provide customized versions of the firmware, outside the standard line of releases. In this case, please follow the indications provided directly to you by aqua.

In order to perform this type of update the unit must the connected to your LAN.
In this update mode you need to do download the appropriate update file from the website or provided directly to you by aqua.

Press the **M2** key.
The display will indicate the IP address of the unit (example 192.168.1.7:8080).

Make a connection to this IP address (example 192.168.1.7:8080), using a computer and a normal browser (Chrome, Firefox, Safari, Edge, Internet Explorer…) and follow the indications on the browser screen.

At the end, the unit will power-off automatically.

6. **Serial Port**

The unit can receive a certain number of commands from the RS-232 serial interface.
The 9-pin DB-9 connector is located on the rear of the unit.
RS-232 parameters to be used: 9600,n,8,1
The commands are made up of 4 characters preceded by '*' and followed by '#'.
At least 100 mS must elapse between one command and the other (1 Sec in the case of the power-on command).
For monitoring, the command received is immediately re-transmitted by the device (the communication parameters remain the aforementioned 9600, n, 8, 1).

RS232 Commands:
*PWR1# : power-on
*PWR0# : power-off
*MOD1# : module 1 select
*MOD2# : module 2 select
*MOD3# : module 3 select
*MOD4# : module 4 select

*DIS0# : display OFF
*DIS1# : display ON
*FUNC# : as front panel 'FUNC' key
*STAT# :

Following this command, the unit transmits a sequence of characters indicating the current status, i.e.
1) power-on / power-off status (PWR1/PWR0)
2) selected module (MOD1/MOD2/MOD3/MOD4)
3) LAN present / absent (ETH1/ETH0)
4) audio signal type (PCM/DSD)
5) bit number (16bit/24bit)
6) sampling frequency (44K1..768K se PCM, DSDx1/DSDx2 if DSD)
7) display enabled/disabled (DISP1/DISP0)
Electrical interface:
Communication is two-wire (tx, rx) type, without handshaking.
To connect to the PC you need a DB9-female / DB9_female cable of the "straight" type (ie without TX / RX inversion), which makes the following connections:
pin2<-->pin2
pin3<-->pin3
pin5<-->pin5
Maximum cable length:
20 meters (with good quality cable)

7. **Specifications**

Type:	Modular multi-processor network streaming equipment
Architecture:	User-configurable: up to four service-dedicated streaming processors on interchangeable slots of the main-board. Internal custom developed LAN switch. Dedicated power-supply for every slot. Separate microcontroller for supervisory control and user interface.
User interface:	2x20 character OLED display The display shows information like the activated streaming service, the sampling frequency and the word bits (16 /24) measured in real-time. Keyboard on the front panel (seven keys) IR remote command (on request)

aqua
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Handcrafted in Italy