USB-X4
Interface

USER MANUAL

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INFORMATION TO THE USER

- Read and follow these instructions and keep this manual in a safe place.
- Do not use this apparatus near water
- Do not install near any heat sources such as radiators, heaters, or other apparatus (including pre-amplifiers and amplifiers) that produce heat.
- Do not install this apparatus in a confined space such as book cases or closed cabinets.
- Unplug this apparatus from the mains during lightning storms or when unused for long periods of time.
- Alteration or modification carried out without appropriate approval may invalidate the user's right to operate the equipment

CAUTION

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RISK OF ELECTRIC SHOCK
DO NOT OPEN

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER. NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

WARRANTY

Playback Designs warrants the USB-X4 product against defects in material and workmanship under normal use and service for a period of time specified by the product's serial number from the date of first delivery to the owner. The warranty time period is for 30 days. If within the first 30 days of ownership you register your Playback Designs product, by sending us a copy of your sales receipt, your name, address, city, state, zip code, phone number, email address and your dealer's store name, we will extend the warranty to 3 years.

Playback Designs will pay for return shipping charges (domestically) back to the owner when the product is sent to Playback Designs within the first 30 days after purchase and the fault can be confirmed by Playback Designs. Otherwise, owner will be responsible for all shipping charges to and from Playback Designs. International customers must deal with their local dealer or distributor.

For all warranty claims, a copy of the original invoice must accompany the product.
Opening the product or modifying it in any way by the owner, including but not limited to cryogenic treatment, will void any warranty.

Please contact Playback Designs for instructions before shipping any product to Playback Designs.

Playback Designs products are sold worldwide through authorized dealers with restricted territories. If any Playback Designs product is purchased from non-authorized dealers or from a dealer selling outside his / her authorized territory all warranties will be void.

If you purchased this product from a dealer please take a moment and send us an email to info@playbackdesigns.com so we can register you for warranty. If this product has been shipped to you directly from Playback Designs you are automatically registered.

BEFORE USING THE PRODUCT

- What is in the box: USB-X4 interface system
  PLINK optical cable
  User manual

- Registration   If you purchased this product from a dealer please take a moment and send us an email to info@playbackdesigns.com so we can register you for the warranty.

- Installation: Do not place the interface over an amplifier or any other equipment that generates heat.

PLAYBACK
DESIGNS

BENEFITS OF THE USB-X4 AND THE PLINK INTERFACES

Any USB interface requires a processor for reception and transmission. The standard also requires a very specific clock frequency for its basic transmission and, unfortunately, that clock is not any integer multiple of any audio sample rate. This means that some degree of "frequency beating" can be expected between the USB clock and the audio sample rate if the USB receiver circuitry is in the same chassis as the digital audio processor (DAC, player etc.). This can be an audible effect if the product is a DAC.

All our products have an internal USB interface for direct connection to a music server and we designed all circuits to minimize this interfering beating effect. Ideally, however, one would want to move the USB interface as far away from the DAC as possible, which would fundamentally avoid this effect completely before it even happens. While our products with internal USB interface do a good job in compensating for this effect, a physically external USB interface could provide an extra level of separation that otherwise could not be possible.

This is where the USB-X4 interface comes in:

Physical separation: It is a USB receiver in an external and separate small chassis that can be placed far away from the DAC.

Galvanic separation: It then interfaces with the DAC via a very high quality fiber optic cable (PLINK) that implements a protocol that is synchronous to the audio sample rate (no frequency beating). Furthermore, since PLINK is a fiber optic interface there is no galvanic connection between your server and DAC. This is an additional separation that prevents any electrical noise from reaching the sensitive DAC.

Jitter prevention through reclocking: The USB-X4 sports the same reclocking / buffering algorithm (PDFAS) as all our other products (DAC, transport, player) and therefore provides a second level of filtering and jitter removal in addition to the connected DAC.

The overall performance improvement can be quite dramatic when compared to a DAC with an internal USB interface. The sound stage becomes even more alive or vibrant, frequencies are more revealing and musicality is even more natural.

A quick explanation of the **PLINK Interface**: PLINK is a high quality fiber optic link used on most Playback Designs equipment and natively supports all formats of PCM and DSD. Because its media is fiber optic it separates the sensitive circuitry in your Playback Designs DAC from the generally "noisy" digital sources with high clock jitter. This separation can result in a dramatic sonic improvement when compared to a direct connection with the DAC via for instance USB.

The first version of the PLINK interface was launched more than 15 years ago and supported DSD up to 5.6MHz. This version is called "Classic" and is implemented in the 5-series products and IPS-3 (that have not been upgraded yet). As technology never sits still DSD has been expanded to 11.2MHz several years ago. Accordingly we also expanded the PLINK format and called it "Sonoma" reminiscent of its origin in the professional recording tool for DSD (Sonoma workstation) that was developed by the founder of Playback Designs during the development of the SACD and DSD formats.

PLINK does not use the same media as TosLink, but it is based on a much higher quality and lower jitter media that is used for very high bandwidth communication links where receivers require an extremely low jitter signal for reliable decoding. For PLINK we use a much lower bandwidth protocol than the specified limit of the media to further increase robustness against jitter.

Compatibility: the PLINK interface implemented in the USB-X4 is compatible with the following lines of Playback Designs products: Sonoma, Edelweiss and Dream series. It is not compatible with the earlier 5-series products.

FRONT PANEL STATUS LED ("ReTurn For Manual")

The front panel has a single LED with the following functions:

Green solid: USB cable is connected and USB connection to server is established.

Green blinking: Power is applied via external (optional) power supply, but no USB connection is established yet.

Red blinking: Device's firmware is being upgraded - do not interrupt process or remove power while this is on.

Red solid: Firmware upgrade has not been successful - see corresponding chapter in this manual for further instructions.

PLAYBACK
DESIGNS
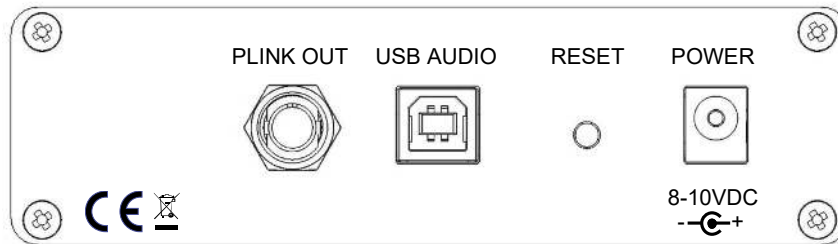
CONNECTIONS

USB: Direct USB connection to computers and servers for PCM at sample rates up to 384kHz and DSD up to 11.2MHz. Audio played into this interface from an external source will be encoded natively to the PLINK format to be sent to a connected Playback Designs digital product.

PLINK OUT: Proprietary and high quality optical link to other Playback Designs equipment such as the MPD-8 DAC and others. This connection is the main output of the USB-X4 and supports multiple audio formats natively for PCM and DSD. This version of PLINK ("Sonoma") is not compatible with the MPS-5 / MPD-5 products.
The physical cable is standard with the following specifications: ST-ST fiber optic, 62.5/125 um, OM1, multimode. It is available through mail order or computer stores.

POWER: The USB-X4 is designed to be powered off the USB bus and therefore does not require an external power supply. However, an external power source can be connected. The voltage should be 8V-10V DC and a connector with the following specification should be used:
2.5 mm inner diameter
5.5 mm outer diameter
9.5 mm barrel length
+ voltage on center / - voltage on outside
The external supply should be able to supply about 1A.

RESET: Used in connection with software update procedure. When pressed during normal operation it resets the interface.

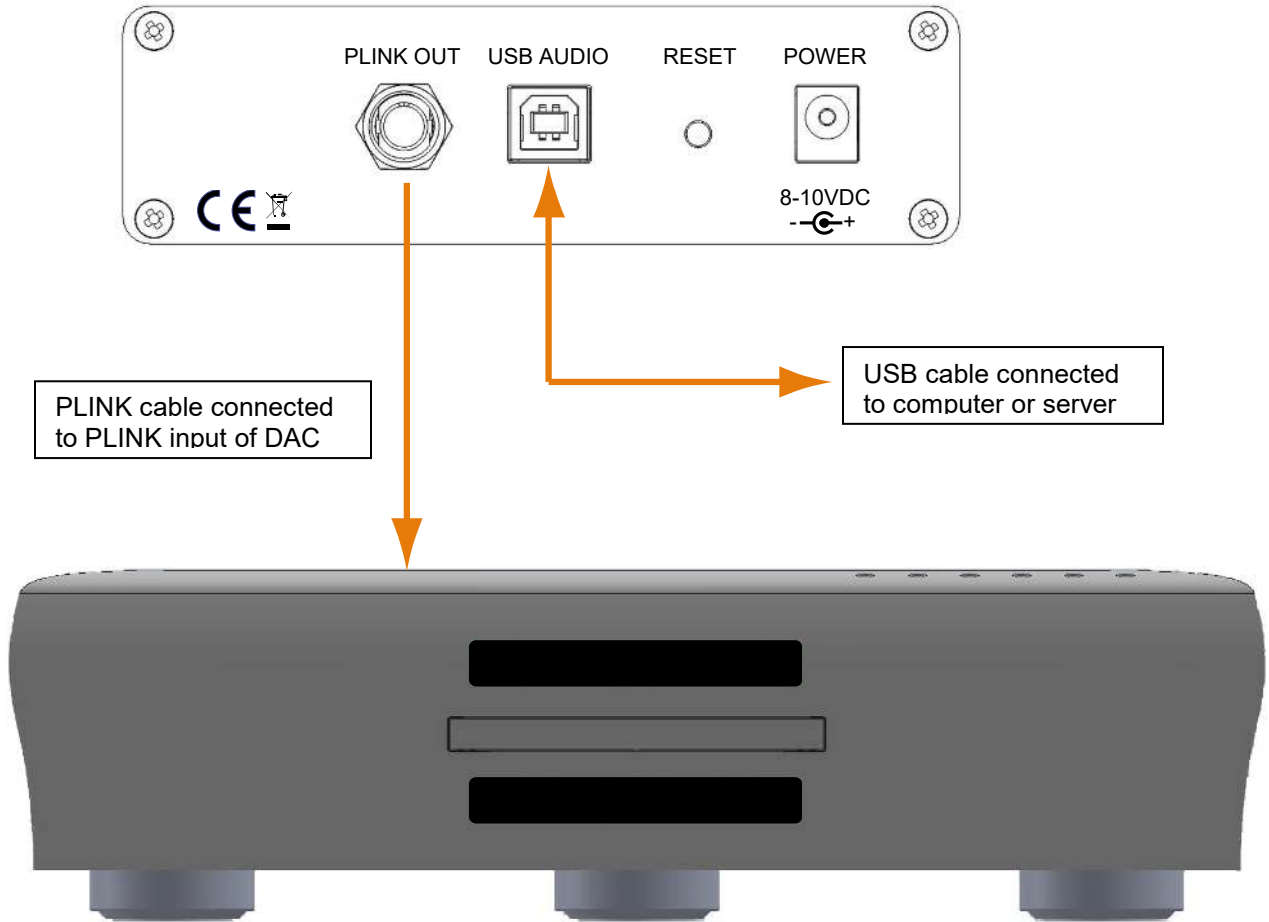# POWERING UP THE USB-X4 WITH NO EXTERNAL POWER SUPPLY

1. Set the format of the PLINK input of your Playback Designs DAC to "Sonoma".
2. Connect the PLINK input of your DAC to the PLINK output of the USB-X4.
3. Connect the USB cable between your server and the USB-X4
4. You will see a solid green LED on the front panel.

POWERING UP THE USB-X4 WITH AN EXTERNAL POWER SUPPLY

1. Set the format of the PLINK input of your Playback Designs DAC to "Sonoma".
2. Connect the PLINK input of your DAC to the PLINK output of the USB-X4.
3. Connect 8-10V DC to the power connector of the USB-X4.
4. You will see a blinking green LED on the front panel.
5. Connect the USB cable between your server and the USB-X4
6. You will see a solid green LED on the front panel.

CONNECTING THE USB-X4 TO A PLAYBACK DESIGNS DAC

For **playing files** from a computer or server use this connection diagram as guideline:

PLINK OUT   USB AUDIO   RESET   POWER

8-10VDC

PLINK cable connected to PLINK input of DAC

USB cable connected to computer or server

CONNECTING THE USB-X4 TO A WINDOWS, MAC OR LINUX BASED PC

Supported resolutions: PCM: all sample rates up to 384kHz and word lengths up to 24 bits. DSD: native up to 11.2MHz and DoP up to 5.6MHz

Connection protocol and method: USB 2.0 / Audio class 2.0 compliant, asynchronous mode where the USB-X4 generates a high precision clock master and computer is clock slaved.

PC requirements: Windows 7 or later, ASIO compatible player software such as JRiver etc.

Mac requirements: OS X (10.6.6 or later)

Linux computer requirements: Any Linux version with kernel-integrated USB driver (not ALSA).

In order for your computer to communicate with the USB-X4 and to exchange audio data a custom driver software needs to be installed before you can connect it to the USB-X4. If your computer is a Mac running OSX 10.6.6 or later or you are using a Linux computer you don't need any driver software. DSD file playback is supported on Mac via the DoP standard, and on Linux computers natively up to DSD4x. A driver has to be installed on all Windows based PCs for any kind of audio playback via the USB-X4.

Driver software installation and first time connection on Windows based computers:

1. Download the latest USB driver from the support section on our website:
   www.playbackdesigns.com

2. Double click on the installer and follow instructions on your screen.

3. Connect the included USB cable between the USB AUDIO connector on your USB-X4 and your computer.

4. Connect the PLINK cable between the PLINK OUT connector on your USB-X4 and the PLINK input on your Playback Designs DAC. Select the PLINK input on your Playback Designs DAC.

5. The computer will take a moment to enumerate the USB-X4 on its USB bus and notify you when it is installed successfully. You can check successful driver installation and connection in the device manager, where the driver will show up as AKDesign USB Audio under the Sound, Video and Game Controllers tab. It will not be listed in the Sound Control panel.

6. Configure your player software to send audio data to the ASIO interface. Depending on your player software this may be identified as "AKDesign USB ASIO" or simply as "ASIO". Some players may need a plug-in for ASIO compatible playback.

7. For best performance and bit perfect reproduction make sure to set all volume controls in the computer playback software to exactly 0db (wide open), turn off all effects or equalizer that might be running in your playback software. Control the volume only with your analog pre-amp.

Connecting Apple or Linux computers:
No driver needs to be installed. If you are planning to play DSD files on a Mac make sure your playback software sends them via DoP to the USB-X4. Linux supports DSD playback natively without DoP.

During playback with PC
When changing songs from within your player software running on your computer, the USB protocol automatically communicates all necessary sample rate changes to the USB-X4 and then to the Playback Designs DAC. The front panel of the connected Playback Designs DAC always indicates the true sample rate during file playback. This system will never perform any sample rate conversion or any signal processing that could adversely affect the sonic performance, but rather use the exact bits from your file and convert them directly to analog.

During playback with Mac
The native OSX operating system and iTunes do not understand the needs of audiophile consumers and insist on sample rate conversion. When connecting the USB-X4 OSX will automatically select the highest possible sample rate (384kHz) and convert all your songs to this rate before playing them out through USB. This will result in degraded performance. You can manually select the sample rate in the Audio/MIDI Setup utility to correspond with the native sample rate of the song, but this can be a tedious process if your library contains songs with more than 1 sample rate. Alternatively, 3rd party plug-ins for iTunes exist that automate this process and always select the correct sample rate for bit perfect playback.

Playback of DSD files
The driver software and USB-X4 hardware are designed to support playback of DSD files at sample rates up to 11.2MHz. You will need a playback software running on your computer that can read DSD files and play them to the USB driver. On the Mac platform you will have to use a playback software that supports the DoP standard for playing DSD files.

General notes
1. For best performance and bit perfect reproduction make sure to set all volume controls in the playback software, control panel to exactly 0db (wide open), turn off all operating system sounds, effects or equalizer that might be running in your playback software or Windows / OSX. Control the volume only with your analog pre-amp or the internal analog volume inside your DAC.

2. The Windows driver only supports audio via the ASIO interface and it does not support the standard Windows audio interface (WASAPI). With this the USB-X4 will not appear in the Windows Sound control panel. If you want to play via the standard Windows audio interface you will need to install a small utility such as "ASIO Bridge".

PLAYBACK
DESIGNS

UPGRADING THE FIRMWARE IN YOUR USB-X4

Playback Designs is constantly innovating new algorithms and methods for audio processing and from time to time may release new firmware for the USB-X4 that may further enhance the sonic performance or add new features. New releases will be distributed as audio wave files. They can be played into the USB-X4 via its USB input just like any other audio file. The USB-X4 processor will automatically detect this file and update the firmware. No audio will be audible as the processor will automatically mute all outputs.

Upgrade Procedure:

1. Connect the USB-X4 to your computer via USB.

2. Load the wave file with the update firmware into your player software on your computer. As iTunes on Mac computers is not a bit perfect player you cannot use iTunes for this procedure, but we have confirmed that Audirvana works perfectly on Mac computers. On the Windows platform we have verified Foobar and Roon, but JRiver won't play this file.

3. Play the file.

4. The front panel will indicate red blinking LED. It is important that at this point you no longer touch the system, nor your PC, don't turn the power off. Go have a glass of Playback Designs wine, because it will take about 2 minutes for this to finish.

5. Once playback has finished the front panel LED will return to its normal state (solid green) or it will indicate an update failure by showing a solid red light. A failure can happen when you didn't follow the instructions in the previous steps or your PC had a dropout during playback. If this failure happens, don't panic, but follow the next steps precisely:
   a. DO NOT POWER OFF the USB-X4.
   b. Push the RESET button on the rear panel.
   c. play a normal audio file to make sure everything is still working normally.
   d. Stop playback and go to step 3.

6. If playback of the update file has finished and the front panel does not show a solid red LED, but indicates normal operation with a green light then stop playback and disconnect the USB cable.

7. If you power the USB-X4 with an external power supply, disconnect the power.

8. Power on the USB-X4 by either applying external power or connecting it via USB to your computer.