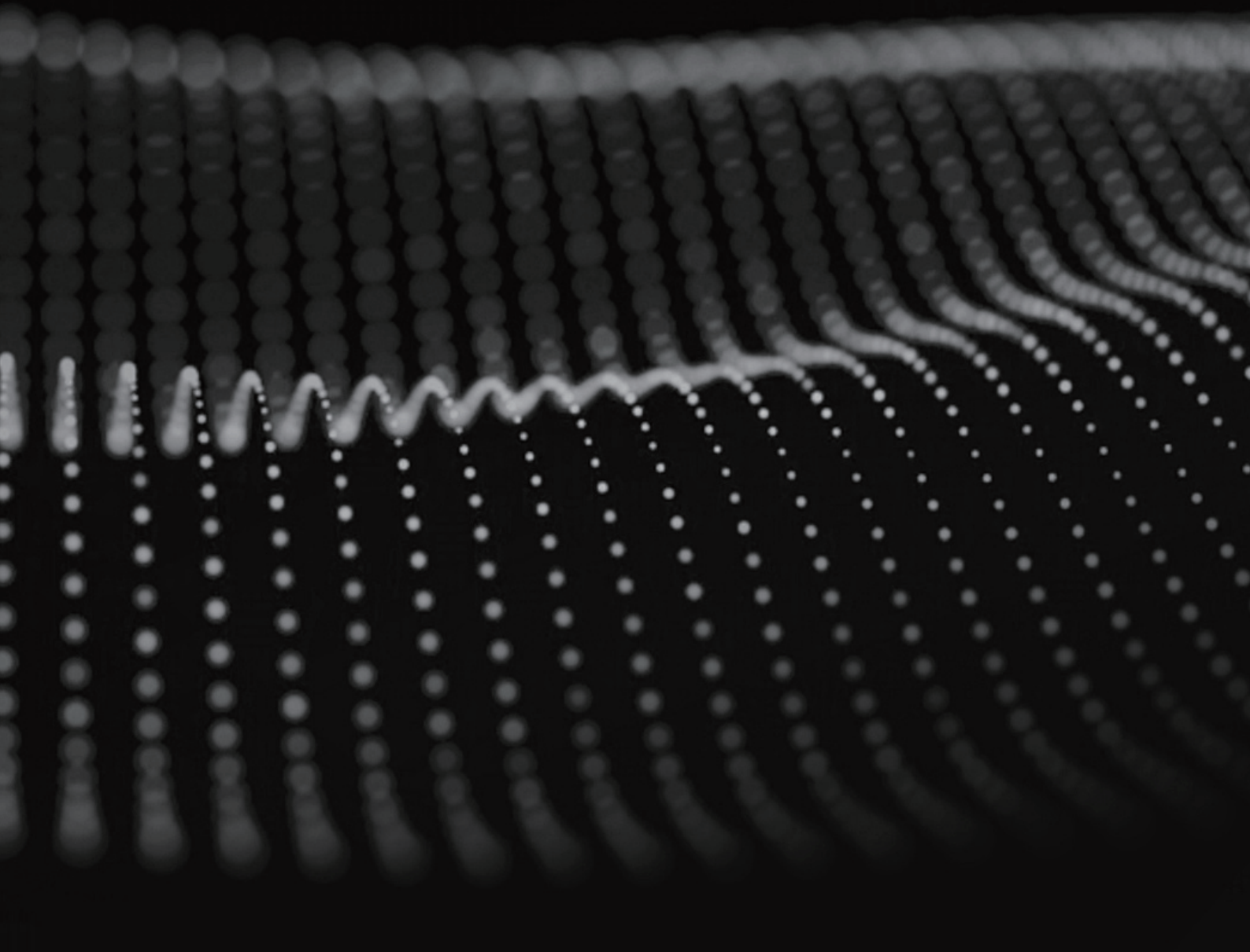


# DENAFRIPS

## Erato user's manual

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Experience the art of natural sound with elegance and refinement, revealing a high-fidelity, pure, captivating, and smooth sonic performance.



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# 1. Installation and Safety Instructions

This Digital-to-Analog Converter (DAC) has been designed and manufactured to ensure stable and reliable operation. However, as with all electronic equipment, certain precautions should be observed during use:

- Carefully unpack the product. The package contains one Erato DAC, one power cord, and one warranty card.
- Place the DAC on a stable, level surface, such as a sturdy shelf or equipment rack.
- The Erato is available in two voltage versions: 115V, 60Hz and 230V, 50Hz. Before connecting the power cord, please ensure that the voltage rating matches your local mains supply.
- Position the power cord and signal cables where they will not create a tripping hazard or be accidentally pulled.
- Never place the DAC near water sources, and do not place containers filled with liquid on top of the unit. Liquid entering the DAC is dangerous and may result in electric shock and/or fire.

# 1. Installation and Safety Instructions

- Never place the DAC near water sources, and do not place containers filled with liquid on top of the unit. Liquid entering the DAC is dangerous and may result in electric shock and/or fire.
- Do not expose the unit to direct sunlight or place it near heat sources.
- Do not remove any covers or attempt to access the interior of the unit. There are no user-serviceable parts inside.

No adjustments, replacements, or fuse changes should be carried out by the user.

- Clean the unit periodically using a soft, slightly damp cloth. Never use cleaning agents, as they may damage the surface finish.
- The electronic components used in modern high-fidelity audio equipment are highly sophisticated and may be damaged or malfunction due to lightning strikes. During thunderstorms, disconnect the power plug from the mains supply to help protect your audio system.

## 2. Introduction

Thank you for purchasing the DENAFRIPS Erato Digital – to – Analog Converter.

The Erato was designed with a single goal in mind – to present digital music to today’s music enthusiasts with an analog – like sound character. It incorporates advanced hardware design, powerful digital processing technologies, and extensive experience in both recording and playback, all working together to achieve the ultimate goal of digital music reproduction – the musical expression itself.

The architecture is built upon the most fundamental R – 2R digital – to – analog conversion technology, which may well be the most suitable architecture for reproducing music. Although various measurements and performance tests indicate that traditional R – 2R DACs generally do not perform as well as mainstream integrated DAC chips in terms of technical specifications, the sound produced by R – 2R DACs is often emotionally engaging, relaxing, highly resolving, and rich in musicality – qualities that most common mainstream integrated DAC chips are unable to match.

# 3. Design Highlights

## 3.1 Adaptive FIFO Buffer Reclocking

DENAFRIPS employs a First – In, First – Out (FIFO) buffer reclocking method to address jitter issues. The adaptive FIFO buffer stores the incoming digital audio data in memory. The data is then read from memory using a low – phase – noise, high – precision femtosecond clock located within the Digital – to – Analog Converter (DAC).

This technology is nearly perfect, especially when combined with the local FEMTO clock technology. The resulting jitter level is extremely low and virtually negligible.

## 3.2 Proprietary, State – of – the – Art USB Interface

The Erato is equipped with a proprietary USB audio solution driven by the advanced ARM – based STM32F446 microcontroller.

## 3. Design Highlights

DENAFRIPS has redesigned and optimized the circuitry, enabling the DAC to serve as a high – end digital – to – analog converter when used with computers and streaming devices. It supports PCM data streams up to 24 – bit/1536kHz and is capable of native decoding of DSD formats up to DSD1024. It is supplied with a licensed THESYCON USB driver for the Windows platform.

Note: The USB module is activated only when the USB input is selected. This design is intended to reduce interference between digital input interfaces and achieve optimum sound quality. High – resolution format support may vary depending on system compatibility.

### 3.3 Proprietary S/PDIF Digital Audio Receiver

The S/PDIF coaxial and optical inputs support digital audio formats up to 24 – bit/192kHz.

## 3. Design Highlights

The Erato abandons the conventional use of dedicated digital audio receiver chips. Instead, the digital data is decoded by the built – in FPGA (Field – Programmable Gate Array), shortening the signal path and eliminating undesirable coloration and distortion.

### 3.4 NOS / OS

The Erato allows users to change the sampling mode instantly.

NOS, short for Non – OverSampling, means that the incoming digital audio data is not oversampled.

In OS mode, PCM audio data based on 44.1kHz or 48kHz sampling rates is upsampled to a maximum rate of PCM 1411.2kHz or PCM 1536kHz. DSD audio signals, however, are not subjected to any upsampling process.

# 3. Design Highlights

## 3.5 Proprietary R – 2R and DSD Decoding Architecture

The Erato is equipped with a 24 – bit R – 2R digital decoder for decoding PCM data streams, as well as a 32 – stage FIR analog filtering hardware decoder for decoding DSD data streams.

These designs ensure perfect decoding of PCM formats while also providing flawless decoding of DSD formats. In today’s market, R – 2R digital decoders capable of hardware decoding for both PCM and DSD formats remain exceptionally rare.

## 3.6 Digital – to – Analog Converter Architecture



### 3. Design Highlights

Digital Signal Processing – All incoming digital audio data is stored in the high – speed RAM of the onboard FPGA.

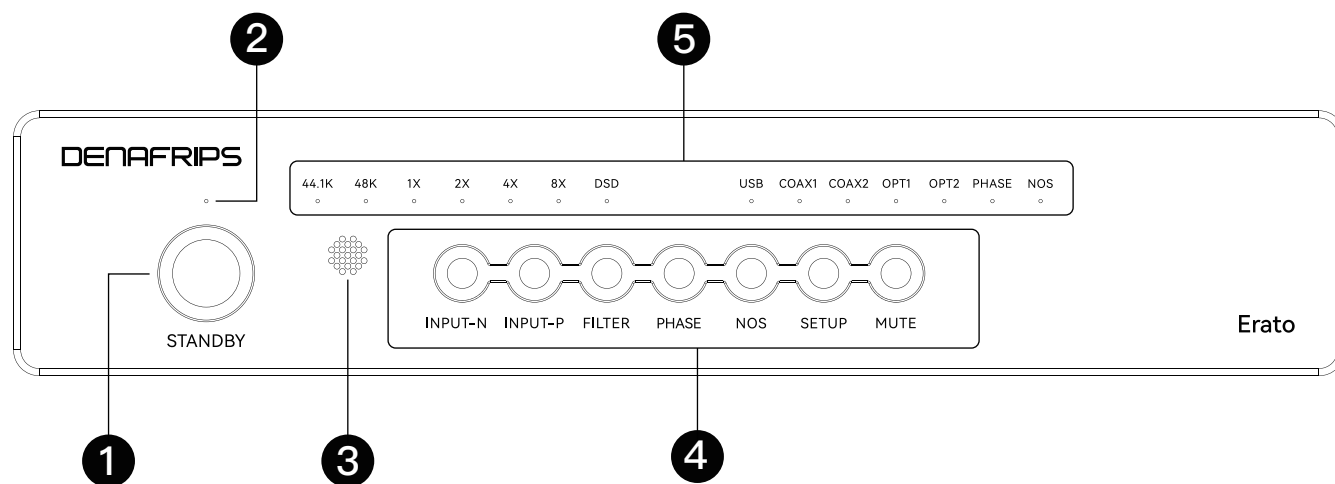
Oven – Controlled Crystal Oscillator (OCXO) – The data is read from memory by a low – phase – noise, high – precision oven – controlled crystal oscillator located within the DAC. The processed data is then sent to the final segmented binary resistor network (R – 2R) for digital – to – analog conversion.

R – 2R Linear Network – The data bits are converted into analog signals through a truly balanced R – 2R linear network array. The linearity of this conversion is ensured by high – precision thin – film resistors, whose ultra – low temperature coefficient of 10/15 ppm provides stable and reliable performance.

# 4. Operating Instructions

## 4.1 Quick Start Guide

The Erato is very easy to use. However, please be sure to read this section to fully understand its functions and features.



### Description:

#### ①. Standby Button

Press the button once to turn on the DAC. Press it again to switch the DAC to standby mode.

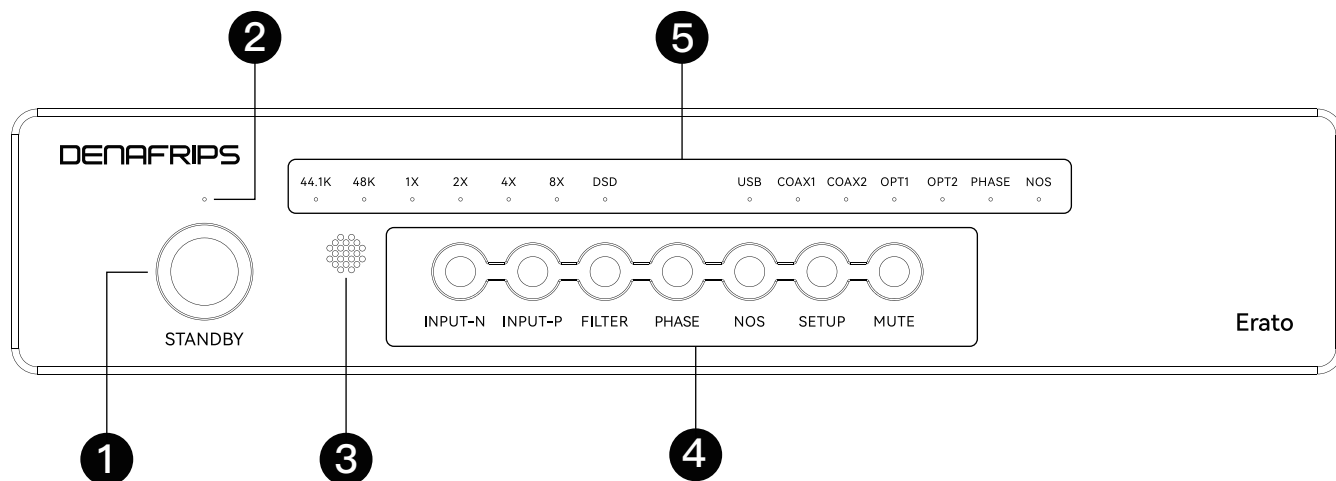
#### ②. Indicator Light

When the DAC is in standby mode, the indicator light should be on. When the DAC is in operating mode, the indicator light will appear dim.

#### ③. Infrared Remote Control Receiver Window

Supports remote operation of the DAC.

# 4. Operating Instructions



## ④. Front Panel Control Buttons

a. INPUT-N, INPUT-P, FILTER, PHASE, NOS, SETUP, and MUTE. These buttons provide direct control of audio input source selection, phase switching, sampling mode switching (OS/NOS), and mute function.

b. Button descriptions

STANDBY ( ① in the diagram) Standby power button: Press the standby power button, the standby indicator light in Figure 1 turns off, and the DAC starts operating; otherwise, the light turns on, indicating the DAC is in standby mode.

## 4. Operating Instructions

INPUT–N button: Selects the signal source to the left.

INPUT–P button: Selects the signal source to the right.

FILTER button: Press to enter filter selection mode.

PHASE button: Phase selection switch. When pressed, the light on indicates inverted output; when off, it indicates non–inverted output.

SETUP button: Press to enter setup selection mode.

NOS button: Source mode and oversampling selection switch. When pressed, light on indicates NOS mode; light off indicates OS mode.

MUTE button: When pressed, all source indicator lights will flash.

## 4. Operating Instructions

⑤. Indicator Lights on the DAC Panel (displaying input source, sampling rate, audio format, and mode)

a. Signal source indicator lights: USB, COAX 1, COAX 2, OPT 1, OPT 2, PHASE, NOS.

These indicator lights represent different input ports. When a specific input source is selected, the corresponding indicator light will turn on.

b. Sampling rate indicator lights: 44.1K (44.1 kHz sampling rate); 48K (48 kHz sampling rate).

These indicator lights show the sampling rate of the current input audio signal.

c. Oversampling multiplier indicator lights: 1X (original sampling rate); 2X (2 times sampling rate); 4X (4 times sampling rate); 8X (8 times sampling rate).

These indicator lights show the current oversampling multiplier of the input audio signal (i.e., multiples of the original sampling rate, see diagram below for details).

## 4. Operating Instructions

d. Audio format indicator light: When the light is on, it indicates DSD; when off, it indicates PCM.

e. PHASE indicator light: When the light is on, it indicates non-inverted phase; when off, it indicates inverted phase.

f. NOS indicator light: When the light is on, it indicates NOS mode; when off, it indicates OS mode.

In OS mode, the DAC processes the incoming digital audio signal and increases the sampling rate.

Oversampling uses interpolation algorithms to add more data points, thereby improving audio quality.

In NOS mode, the DAC processes the incoming digital audio signal directly without any sampling rate processing. This mode preserves the original characteristics of the audio signal.

g. MUTE indicator light: When the light is on, it indicates mute status; when off, it indicates normal audio output.

MUTE button: When this button is pressed, all source indicator lights will flash.

# 4. Operating Instructions

## Digital Audio Signal Input Sampling Rate

The table below shows the status of the input sampling rate indicator lights.

Base Sampling Rate	Multiplier	Input Format
44.1 KHz	1X	44.1 KHz
	2X	88.2 KHz
	4X	176.4 KHz
	8X	352.8 KHz
	16X = 2X + 8X	705.6 KHz
	32X = 4X + 8X	1,411.2 KHz
48 KHz	1X	48 KHz
	2X	96 KHz
	4X	192 KHz
	8X	384 KHz
	16X = 2X + 8X	768 KHz
	32X = 4X + 8X	1536 KHz
DSD	1X	DSD 64
	2X	DSD 128
	4X	DSD 256
	8X	DSD 512
	16X = 2X + 8X	DSD 1024

## Parameter Settings

### Operating System Selection:

1. Press the “SETUP” button once to enter the setup mode.

## 4. Operating Instructions

2. Briefly press the “SETUP + NOS” buttons, OPT1 indicator remains steadily on.
  - NOS light ON = NOS
  - NOS light OFF = OS
3. Wait 5 seconds
4. The Erato returns to operating status

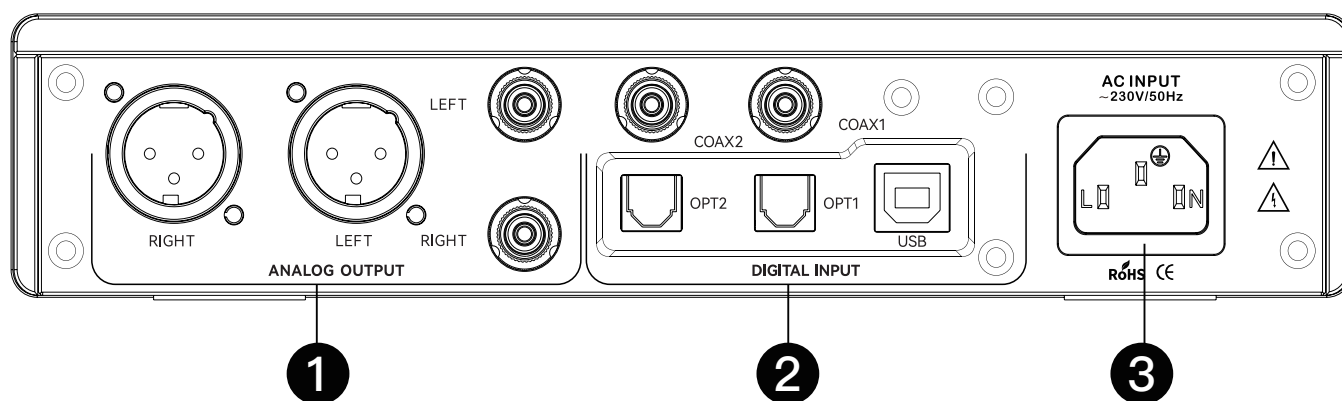
### **Filter Selection (only valid in Operating System mode):**

1. Press the “SETUP” button once to enter the setup mode.
2. Briefly press the “SETUP + FILTER” buttons
  - OPT2 LED ON = Fast filter
  - OPT2 OFF = Slow filter
3. Wait 5 seconds
4. The Erato returns to operating status

### **Phase Selection (only valid in Operating System mode):**

1. Press the “SETUP” button once to enter the setup mode.
2. Briefly press the “SETUP + PHASE” buttons
  - PHASE LED ON = inverted phase
  - PHASE OFF = non-inverted phase
3. Wait 5 seconds
4. The Erato returns to operating status

# 4. Operating Instructions



## Description:

### ①. Analog audio signal output

Balanced output is provided via the XLR interface, and single-ended output is provided via the RCA interface. The Erato is a true fully balanced digital decoder, and we recommend using the balanced output whenever possible. The RCA and XLR outputs are shared; please use only one output at a time. It is not recommended to use both RCA and XLR outputs simultaneously.

### ②. Digital audio signal inputs

There are five input ports in total: USB, COAX1, COAX2, OPT1, and OPT2.

# 4. Operating Instructions

## ③.AC power supply

Attention! Before powering the Erato, please select the correct AC supply voltage. The Erato is available in two voltage versions: 115V, 60Hz / 230V, 50Hz. Please ensure that the voltage rating matches your local mains supply before connecting the power cord.

**Note:**The Erato chassis is connected to the power ground terminal.

# 4. Operating Instructions

## 4.2 USB Driver Installation – Windows Operating System

Windows operating systems (Windows 7/8/8.1/10, 32-bit/64-bit) require installation of a USB driver. This USB driver is licensed by THESYCON and is designed to provide the best possible audio playback performance for computer audio systems.

**Note:** Mac and Linux operating systems do not require a USB driver.

### Installation Guide:

- Please download the driver from the support page:

[<https://www.denafrips.com/support>](<https://www.denafrips.com/support>)

Do not connect the USB cable from the computer to the DAC. Please unplug it before installing the USB driver.

Double-click “DENAFRIPS\_UsbAudio\_v4.82.0” (or the latest version) to install the USB driver.

- Follow the on-screen instructions to complete the installation.

# 4. Operating Instructions

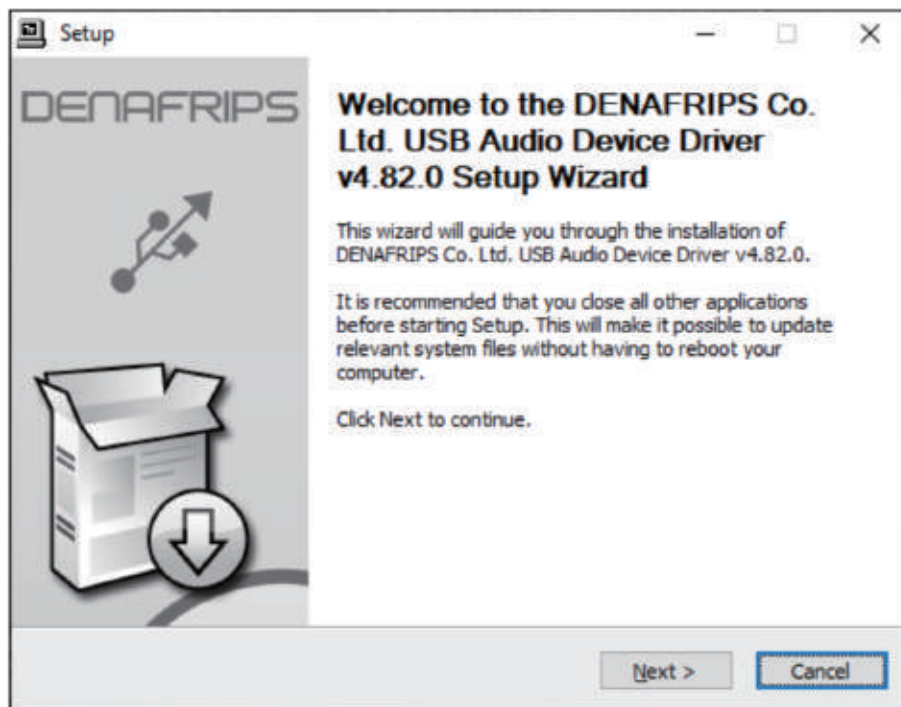


Figure 1. Welcome screen

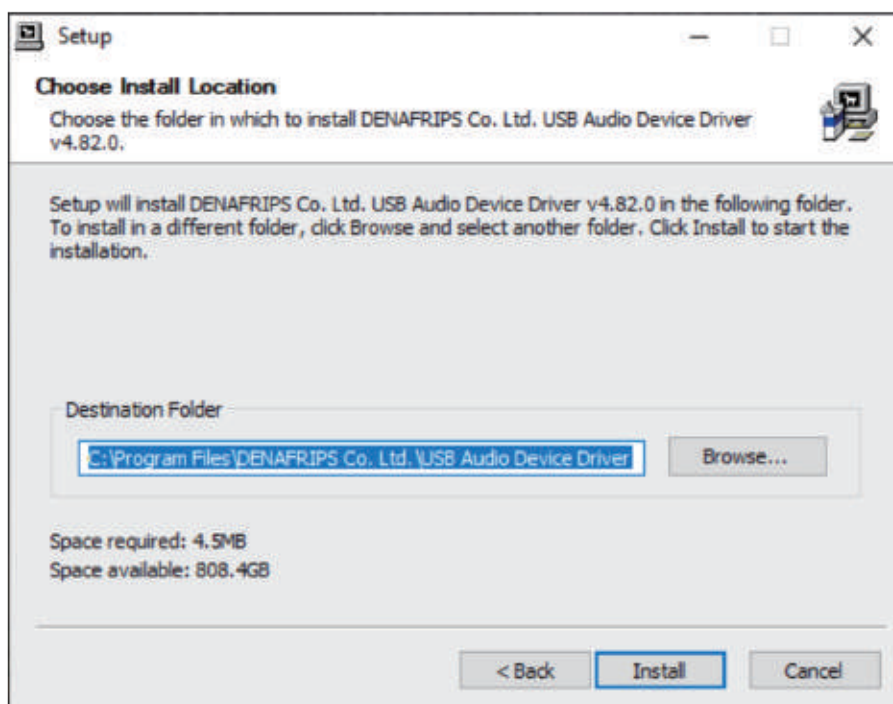


Figure 2. Default installation directory

# 4. Operating Instructions

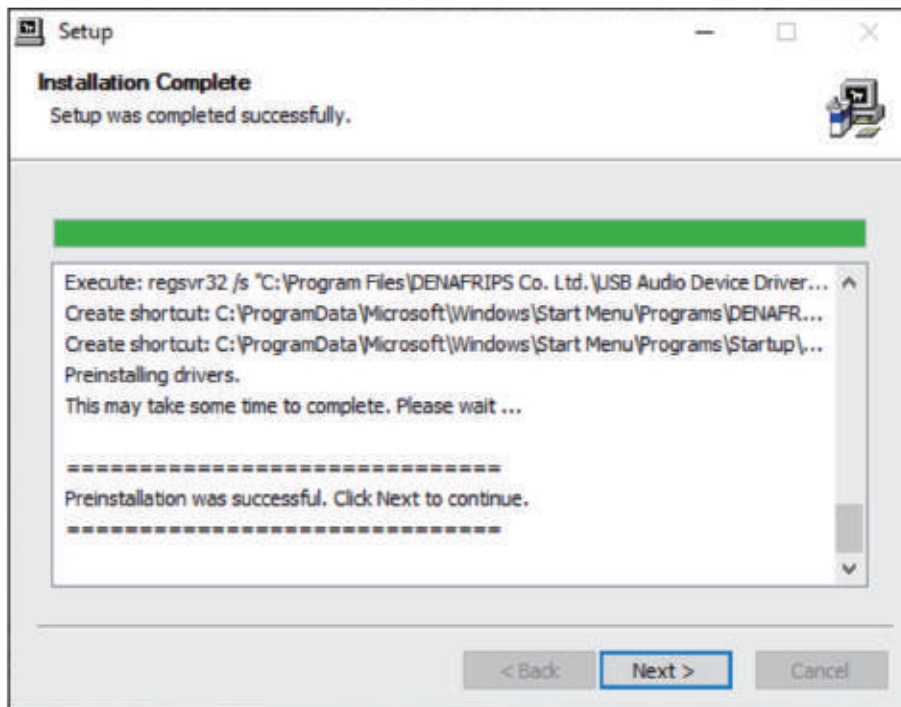


Figure 3. Pre-installation successful

# 4. Operating Instructions

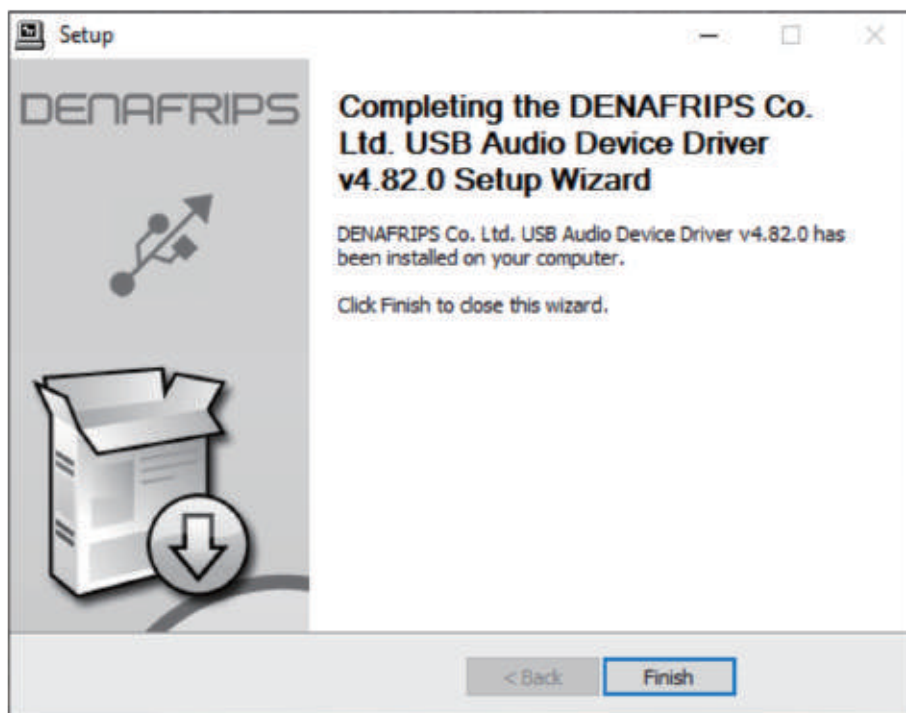


Figure 4. Installation completed

- Restart the computer to complete the installation process.
- Connect the USB cable to the DAC device.
- Turn on the DAC. Select the USB input.
- The USB DAC device will be detected. You can monitor the driver status as shown in Figure 5.

# 4. Operating Instructions

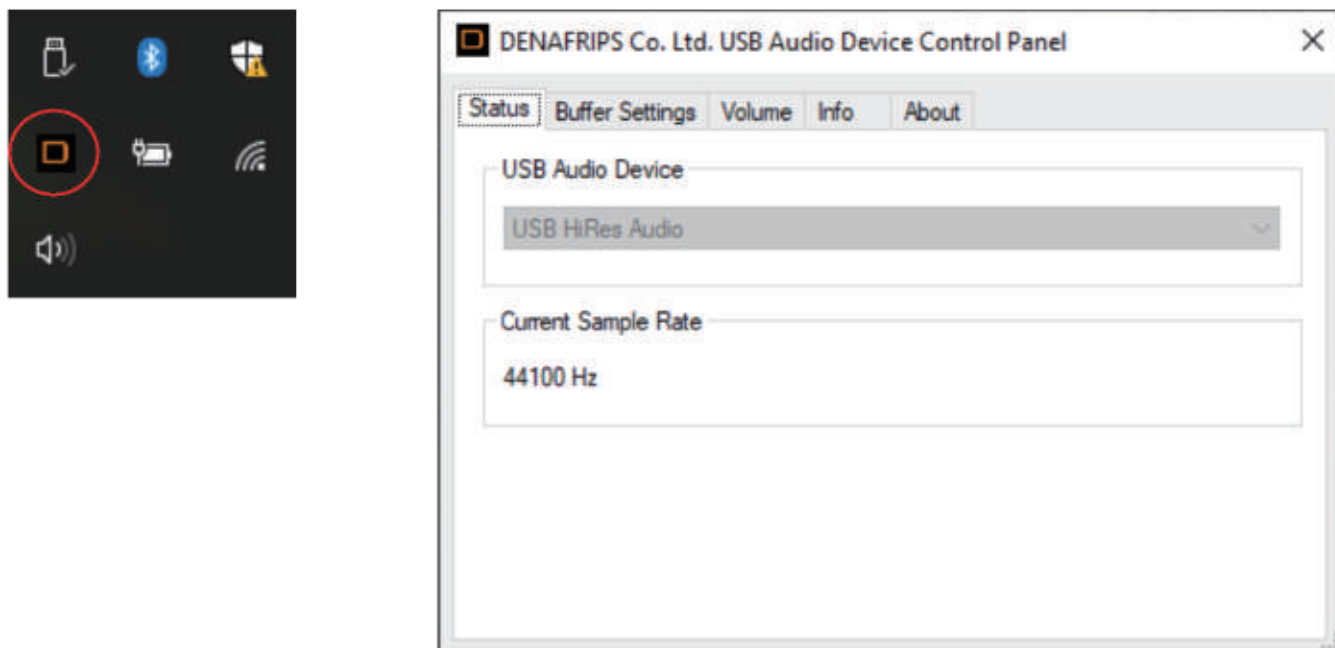
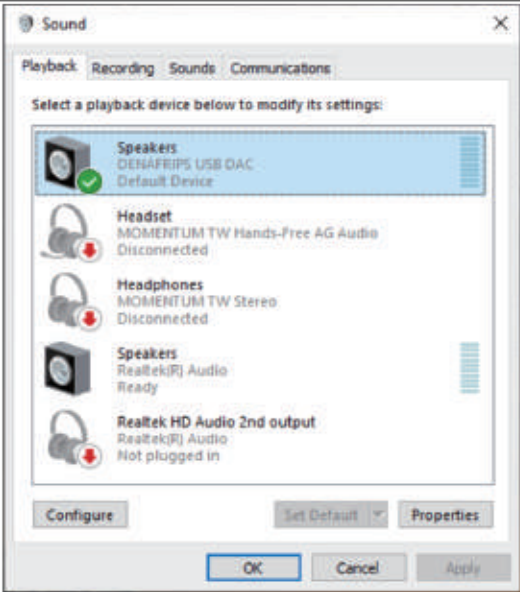
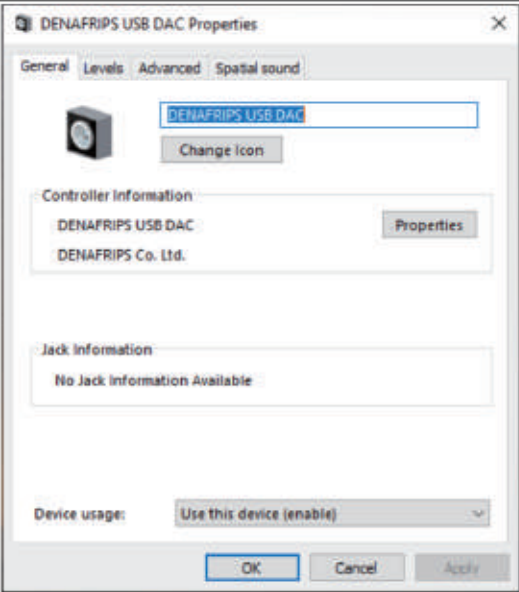
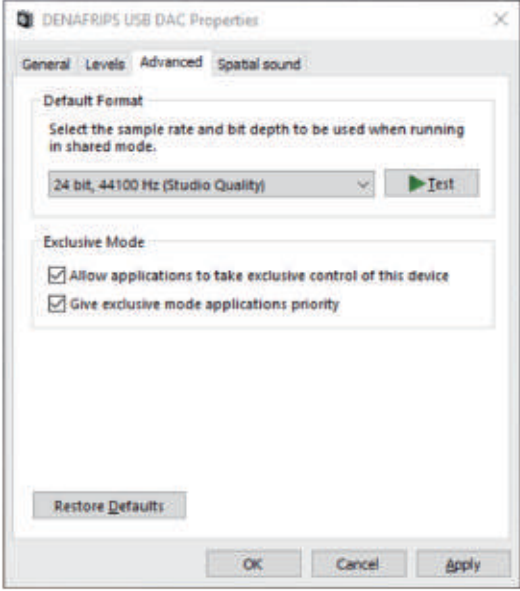
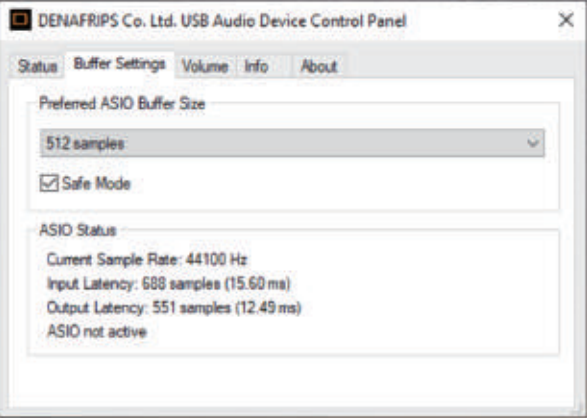


Figure 5. Taskbar and Control Panel

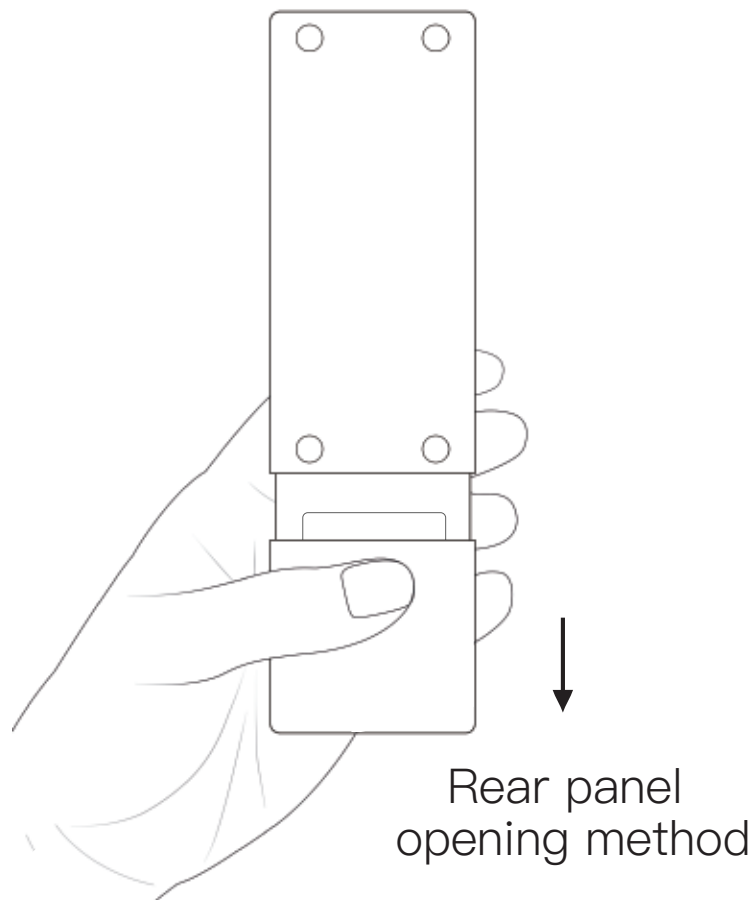
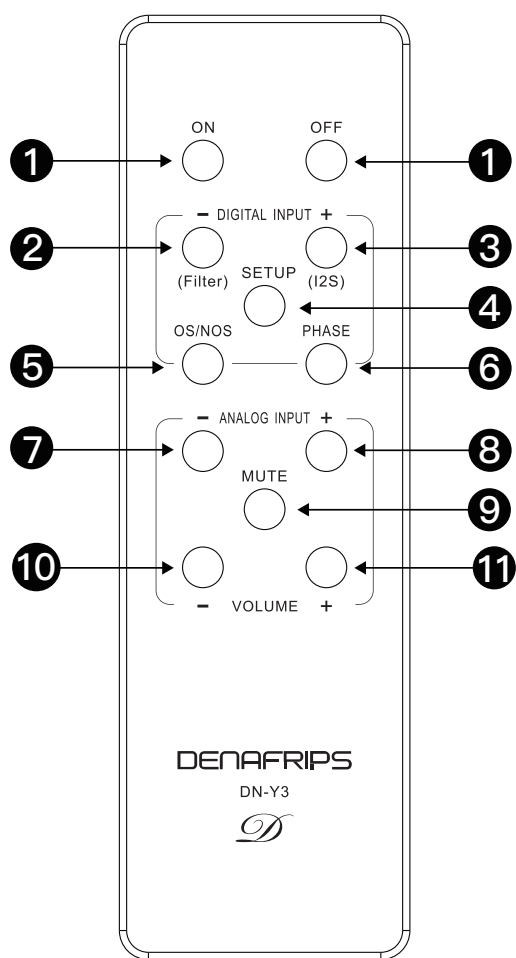
# 4. Operating Instructions

- Set “DENAFRIPS USB DAC” as the default sound card in the Windows operating system.

	
<p>Click the “Set Default” button</p>	<p>Characteristics of DENAFRIPS USB DAC</p>
	
<p>Default format for direct sound</p>	<p>ASIO buffer size</p>

- Recommended playback software: Roon, JRiver, Foobar2000, Sonicstudio Amarra

# 5. Remote Control Overview



- ① ON/OFF button: Turn the device on or off.
- ② INPUT- button: Select or switch to the previous input source. In setup mode, use these two buttons to switch left/right settings.
- ③ INPUT+ button: Select or switch to the next input source. In setup mode, use these two buttons to switch left/right settings.

# 5. Remote Control Overview

- ④ SETUP button: Press once to enter setup mode. If the device is already in setup mode, a short press exits setup mode.
  
- ⑤ OS/NOS button: Switch between oversampling (OS) and non-oversampling (NOS) modes.
  
- ⑥ PHASE button: Press to directly change phase from the front panel.

# 6. Specifications

Description	Parameters
R-2R DAC	Proprietary R2R + DSD Architecture
	True balanced 24BIT R2R + 6BIT DSD (32 steps FIR Filters)
	Low Thermal Effect, High Precision Hand-Matched 0.01% Resistors
	FEMTO Crystal 45.1548MHz, 49.152Mhz
Highlight	Self-developed gold-plated RCA connectors
	Low-noise power supply
	Digital signal processing via FPGA
	Adaptive FIFO buffer and reclocking clock
	USB input supports DSD1024. USB supports PCM up to 1536kHz,
	Proprietary USB audio solution based on STM32F446 ARM Cortex-M4 MCU
	Thesycon USB driver for Windows platform
	No driver required for Mac and Linux
DSD	DSD64 for all inputs
	DSD64–DSD1024 supported via USB only
PCM	24-bit / 44.1, 48, 88.2, 96, 176.4, 192 kHz for all inputs
	44.1–1536 kHz USB only
Digital inputs	Coax x 2
	Optical x 2
	USB2.0 Type B
Analog output	RCA: 2.0V RMS, output impedance 625Ω
	XLR: 4.0V RMS, output impedance 1250Ω
Sampling mode	Non-oversampling (NOS) / Oversampling (OS)
Filter selection	Slow / Fast
AC power requirements	115V/60Hz & 230V/50Hz
Power consumption	≤20W
Frequency response	20–70KHz (+1/-3dB)
Level and gain	4.46Vrms@0dBFS
THD+N	≤0.003%(A)
Signal-to-noise ratio (SNR)	≥119dB(A)
Dynamic range	≥119dB
Stereo crosstalk	≤-87dB
Dimensions	220mm x 255mm x 65mm
Weight	3.2 Kg
Color	Black / Silver
Warranty	12 Months

# 7. Warranty Terms

## After-Sales Service

1. Thank you very much for choosing DENAFRIPS products. This product comes with a one-year free warranty service. During the warranty period, if the product malfunctions due to non-human factors, we will provide free repair or replacement service.

1. Within warranty period: within one year from the date of purchase, under normal use and with no human-caused damage, if any product quality or functional issues occur,

DENAFRIPS will provide free repair or replacement of parts and will cover both-way shipping costs.

2. Within warranty period: within one year from the date of purchase, if any product quality or functional issues are caused by human damage,

the specific cost will be determined according to the actual fault and the cost of replacement parts. Please contact our after-sales service center for a detailed repair quotation. The customer is responsible for both-way shipping costs.

## 8. After-sales Service

3. After warranty period: after the warranty expires, paid repair services will be provided. We will continue to offer maintenance services, with additional charges applied.

The specific cost will be determined according to the actual fault condition and the cost of replacement parts. Please contact our after-sales service center for a detailed repair quotation. The customer is responsible for both-way shipping costs.

### **2. The product will not be eligible for free warranty service under the following conditions:**

- a. The product exceeds the specified warranty period from the date of purchase.
- b. The product does not match the model, barcode, or purchase date listed on the warranty card.
- c. Any circuit or component modification or repair not authorized by DENAFRIPS technicians.
- d. Damage caused by human factors (such as dropping, impact, water ingress, fire, etc.).

## 8. After-sales Service

3. This warranty policy applies only to customers who purchase products from the official website. For products purchased from dealers, the warranty terms shall be governed by the seller's warranty policy.

Symptom	Solution
<b>A. No Audio Output</b>	<ol style="list-style-type: none"><li>1. Check whether all input and output cables are correctly connected.</li><li>2. Check the source volume settings to ensure it is not set to mute and that the volume is at an appropriate level.</li><li>3. Replace the data cable or signal cable to ensure it is not damaged.</li><li>4. Ensure the input source matches the panel selection.</li><li>5. Ensure the unit is not in "MUTE" mode.</li></ol>
<b>B. Noise or Interference</b>	<ol style="list-style-type: none"><li>1. Use the power cable and power adapter to ensure stable power supply.</li><li>2. Check all cables and interfaces to ensure good contact.</li><li>3. Avoid placing the DAC in areas with high electromagnetic interference, such as near power cables or wireless devices.</li></ol>

# 9. Customer Information and Troubleshooting Guide

Symptom	Solution
<b>C. Audio Distortion</b>	<ol style="list-style-type: none"><li>1. Ensure that the input signal sampling rate and format match the formats supported by the DAC.</li><li>2. Adjust the DAC filter and decoder settings to select an appropriate sound quality mode.</li><li>3. Check all signal cables and connectors to ensure they are securely connected and not damaged.</li></ol>
<b>D. Input Signal Not Detected</b>	<ol style="list-style-type: none"><li>1. Ensure that the input signal format and sampling rate match the formats supported by the DAC.</li><li>2. Check the input interfaces and cables to ensure there is no damage or poor contact.</li></ol>
<b>E. Device Will Not Power On</b>	<ol style="list-style-type: none"><li>1. Check whether the power cable and power adapter are securely connected, and ensure the power outlet is supplying electricity normally.</li><li>2. Try restarting the DAC, or disconnect the power and reconnect it.</li><li>3. If the problem persists, please contact the manufacturer, and we will provide a detailed solution.</li></ol>

# 9. Customer Information and Troubleshooting Guide

Symptom	Solution
<b>F. Computer Cannot Detect the USB Device</b>	<ol style="list-style-type: none"><li>1. Ensure that the latest USB driver for the DAC is installed.</li><li>2. Check the USB cable and interface to ensure a good connection and no damage.</li><li>3. Try replacing the USB cable or using a different USB port.</li></ol>
<b>G. Warranty Transfer</b>	You may provide us with the new owner's name, email address, address, and the resale date of the device, so that we can assist in resolving any indirect warranty inquiries after resale.
<b>H. How to Obtain Warranty Service</b>	You only need to contact the DENAFRIPS Support email, then describe the issue and provide the warranty card and device model. We will do our best to assist you with the necessary repair and maintenance.
<b>I. Driver Compatibility</b>	The driver downloaded from the PONTUS 15th official website is applicable to all currently sold DENAFRIPS products. You can use it with confidence.

# 9. Customer Information and Troubleshooting Guide

Symptom	Solution
<b>J. Recommended Operating Duration</b>	Our DACs adopt an R–2R architecture. The longer they are used, the more pleasing the sound quality becomes. However, if the product is not used for more than two days, we recommend turning it off and disconnecting the power.
<b>K. Whether the Signal Is Re-clocked After Passing Through the FIFO Buffer</b>	All digital inputs, as long as they pass through the DAC FIFO buffer, will be re-clocked, and higher-quality source input will result in more refined and better sound quality.

# DENAFRIPS

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✉ support@denafrips.com

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