WANDLA by **Ferrum**

D/A Converter Products Family User's Manual

> 100 MQA* 384.0 kHz | 24bit

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WANDLA by **Ferrum**

D/A Converter Products Family User's Manual



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Thank you for choosing WANDLA!

Just prepare to be converted by the real thing.

WANDLA is Ferrum's flagship D/A Converter. With WANDLA, we are making a statement to the current and next generation of music lovers, because it represents tomorrow's standard of high end digital-to-analog conversion. Think of WANDLA like a Formula 1 racing car. Like the F1 constructors' team building the best racing car, Ferrum created the best engine for The Converter. We transformed our ARM chip, making it capable of doing the work of five chips, and took the ESS Sabre DAC chip to the next level with our new current to voltage converter. With its power technology coming from both OOR and HYPSOS, you may rest assured you are getting the absolute best we can build. By adding a unique set of digital filters, you now can fine-tune your DAC to your specific sonic needs. WANDLA will sound great right out of the box, but please feel free to experiment with the various digital filter settings. Many hours of musical bliss are right in front of you. Enjoy!

WANDLA by **Ferrum** User's Manual February 2025 © **hern** 2025



1. IMPORTANT SAFETY INFO

Warning: To reduce the risk of fire, electric shock or enclosure discoloration, be sure that the apparatus shall not be exposed to dripping or splashing and that no objects filled with liquids, such as vases, shall be placed near or on the apparatus.

Read and follow all the instructions before connecting or operating the component. Keep this manual so you can refer to these safety instructions. Heed all warnings and safety information in these instructions.

Do not allow any objects to get into the enclosure. If the unit is exposed to moisture, or a foreign object gets into the enclosure, immediately disconnect the power cord.

Take the unit to a qualified service person for inspection and necessary repairs.

Unplug this product from the power supply before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

Do not place the unit on a bed, sofa, rug, carpet, or similar surface that could block the heatsink airflow.

If the component is placed in a bookcase or cabinet, there must be ventilation of the cabinet to allow proper cooling.

Keep the WANDLA away from radiators, kettles, heat registers, stoves, or any other appliance that produces heat.

Connect the WANDLA only to a power source that meets its requirements (voltage and amps). We recommend using Ferrum power supplies.

The safest and only method of isolating the device from the power supply is to disconnect the DC plug. Ensure that the DC plug remains accessible at all times.

Unplug the WANDLA during lightning storms or when unused for long periods of time.

Do not route the DC cord where it will be crushed, pinched, bent at severe angles, exposed to heat, or damaged in any way. Pay particular attention to the DC cord at the plug and where it exits the back of the unit.

Immediately unplug and stop using the WANDLA and have it inspected and/or serviced by a qualified service agency if:

- the power cord or plugs have been damaged
- objects have fallen or liquid has been spilled into the unit
- the unit has been exposed to rain



- the unit shows signs of improper operation
- the unit has been dropped or damaged in any way
- when the product exhibits a distinct change in performance.

This indicates a need for service.

Warning: When replacement parts are required after the warranty period, be sure the service technician has used replacement parts specified by the manufacturer or have the same specification as the original part. Unauthorized substitutions may result in fire, electric shock, or other hazards. Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.

Note: In households with small children, an adult should provide supervision until the child is capable of following all the rules essential for the safe operation of the unit.

2. BOX CONTENTS

- WANDLA DAC
- AC/DC power adapter
- USB cable
- power cord
- remote
- quick guide
- TRS 6.35 mm to TRRRS 4.4 mm adapter (WANDLA HP only)

3. DEVICE FEATURES

- Ultra-low THD analog section with very well tuned I/V converter for ES9038PRO
- Hybrid internal power supply (low noise, ultra fast, etc.); power rails are separated i.e. channels are separated
- Digitally controlled analog attenuators for volume control; selectable analog or digital
- Preamp function (analog and digital input selector, volume control, balance, trim for every input etc.)
- Digital filters (upsampler) inside ARM chip designed by HQPlayer creator
- Wide range of inputs including I2S and ARC
- Smart controlling over touchscreen, IR remote, trigger, CEC (TV)
- Ambient sensor to adjust brightness of screen and logo to lightning conditions
- Line outputs (XLR and RCA)
- Unique DSP effects (WANDLA GoldenSound Edition only)
- Integrated headphone amplifier (WANDLA HP only)



4. WANDLA OVERVIEW

4.1 Front Panel

- A. Ferrum logo
- B. touchscreen
- C. IR receiver and ambient light sensor
- D. volume knob
- E. 4.4 mm TRRRS output jack

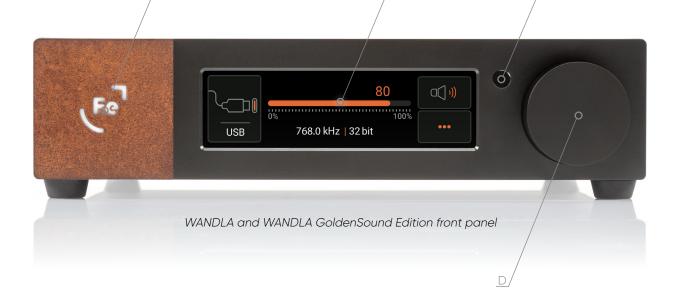




Figure 1



4.2 Back Panel

- A. analog output (XLR)
- B. analog output (RCA)
- C. analog input (RCA)
- D. AES/EBU input (XLR)
- E. S/PDIF optical input (TOSLINK)
- F. S/PDIF coaxial input (RCA)
- G. USB input (Type-C)
- H. ARC input
- I. I2S input
- J. trigger input/output (3.5 mm TRRS jack)
- K. Ferrum Power Link DC input (can be used with HYPSOS)
- L. 5.5/2.5 mm DC power input (can be used with other PSUs)

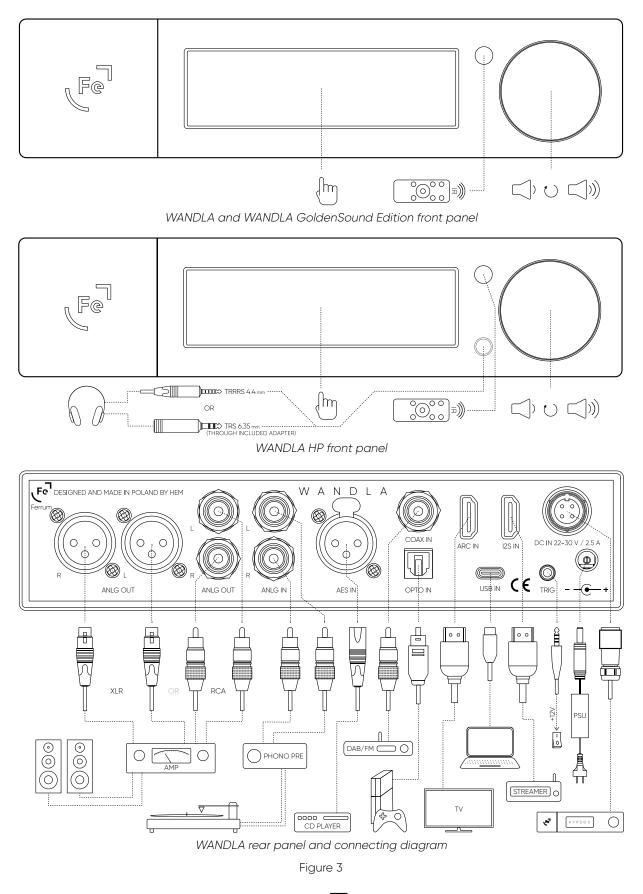


Figure 2



5. CONNECTING THE WANDLA

Note: Please connect all signal cables before connecting DC cable/switching on the WANDLA.



6. GETTING STARTED

After taking the device out of the box and connecting any audio devices in the system (signal cables), connect WANDLA to the power supply.

To turn on the WANDLA touch the screen anywhere. Then tap the icon that appears on the screen. Alternatively, you can use the remote control to turn on the converter.

Touch the Input button (Fig. 4) to select the desired input, then adjust the volume using the knob located on the front panel, remote control or directly on the touch display.

•••

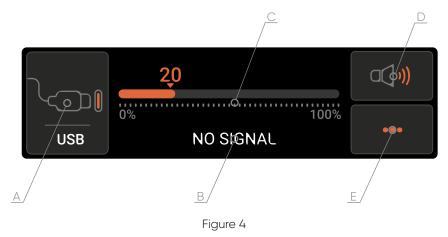
and then select ON/Standby icon

To put WANDLA in standby mode touch Menu button

To turn WANDLA on, touch anywhere on the screen or rotate the knob in any direction - the ON/Standby icon will appear on the screen. Touch this icon and the converter will turn on.

See the next paragraph for more information on how to use the touch screen or how to change WANDLA settings.

7. SCREEN AND MENU STRUCTURE



7.1 Main Screen

A. Input button

When the Input button is touched, a list of all inputs available in WANDLA will appear. Swipe left and right to scroll through the list and activate the desired input with a tap. To go back to the main screen use the Back button.

B. Data format

Display information about the currently playing file, such as sample rate, bit depth and file format.



C. Volume bar

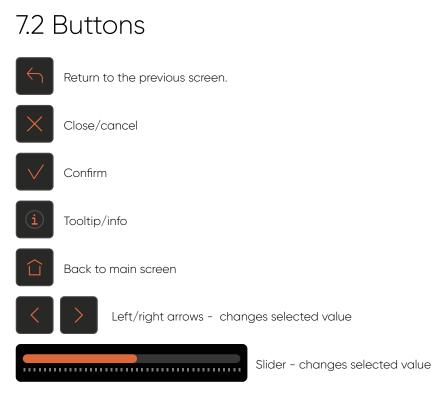
Displays current volume level. It can act also as volume control - simply touch and swipe to left or right to change volume level.

D. Mute

When activated it will mute all outputs. On the WANDLA HP, the speaker icon will change to a headphone icon when you plug headphones or an adapter into the 4.4 mm connector on the front panel.

E. Menu

This button gives access to the functions of the device and the Standby button.



7.3 Menu Structure

7.3.1 STANDBY



This button puts WANDLA in standby mode.

7.3.2 GOLDENSOUND EXCLUSIVE





Contains WANDLA GoldenSound Edition exclusive audio settings.

<u>7.3.2.1 Impact+</u>

Impact+ applies a two-band EQ (low shelf +1dB @110Hz & peak +1.2dB @82Hz) to increase the level of bass



content, and provide an improved perception of "punch" for dynamic elements like kick drum or bass. The EQ operates with 64-bit precision, providing the highest possible sound quality.

7.3.2.2 Tube Mode

Tube Mode intentionally increases the even-order harmonic distortion produced by the WANDLA to emulate the coloration and warmer sound produced by tube amplification.

7.3.2.3 Spatial Enhncmnt (Spatial Enhancement)

Spatial Enhancement utilizes the compute power of SERCE to alter the sound of audio depending on the direction/location of the source, providing a larger perceived soundstage and greater separation between different musical elements.

You can select from two profiles:

- Speaker Mode
- Headphones Mode

Speaker Mode is more subtle as natural sound reflections in the room create natural space for the sound stage.

Headphones Mode is more pronounced as in case of headphones there is no natural channel mixing.

7.3.2.4 License Details

It contains information about the license - the name and the license key.

WANDLA GoldenSound Edition has installed permanent license which cannot be disabled. When GoldenSound features were activcated in WANDLA or WANDLA HP using GoldenSound Edition Converting Plugin (purchased separately) license can be disabled using button **Disable** to deactivate GSE features and return WANDLA to the non GSE state. This unlocks, for example, the ability to fully decode and render MQA files.

After disabling the license, you can enable it again at the same place.

7.3.3 AUDIO



Contains audio settings.

7.3.3.1 Volume Control

Allows you to set preferred volume regulation type - refers to volume and trim.

- Analog digitally controlled resistor ladder
- Digital last stage of DAC processing (will not work with analog input)



7.3.3.2 Upsampling

You can choose interpolation filter type for upsampling slow (44.1kHz - 192kHz) PCM signals. There are two realizations of interpolation filters:

HQ – made by HQPlayer's creator, always upsamples signals to 352.8kHz or 384kHz. Processing is done in SERCE.

ESS – built-in ESS SABRE DAC filters, upsamples signals 8 times. Processing is done in DAC chip.

- HQ Gauss Apodizing filter with focus on optimal time-frequency response. Provides very good transient response and space information. Good general purpose filter fit for most source content and genres.
- HQ Apod. Apodizing filter especially for modern recordings. For recordings made in real acoustics or otherwise having notable space information.
- HQ Apod. MP Minimum-phase version of HQ Apodizing filter. For studio multi-track recordings with focus on transient attack.
- HQ Short Short time domain response, slow roll-off, partially apodizing, single stage filter optimized for transient response. Especially suitable for jazz, blues and similar recordings.
- ESS Lin-Ph A linear phase filter with steep slope after passband (fast roll-off). It has very good aliasing rejection and it has constant delay of all frequencies in the audio band.

Fast (352.8 kHz - 768 kHz) signals are not upsampled.

<u>7.3.3.3 Bypass</u>

Bypasses volume regulator for all inputs to use it with external preamp. After activation converter will work at full volume.

Warning: Please use the Bypass function with caution! A sudden jump in volume may damage your hearing and/or the speakers!

It is best to reduce the input signal at the source to a minimum before the Bypass function is activated.

Note: Ferrum refuses every liability for damage to equipment due to using Bypass function.

7.3.3.4 Theater Bypass

Bypasses volume regulator for analog input only to use it with AVR source and its volume control.

7.3.3.5 Output Balance

This function allows you to change channel balance. It is set to "C" (center) but you can change balance in 1dB steps up to 15 dB channel difference.

7.3.3.6 Digital Input Trim

You can trim the level of all digital inputs up to -12dB. It is realized on selected volume regulator (analog or digital).



7.3.3.7 Analog Input Gain

Here you can trim or gain signal (+/-12 dB) of analog input. It is realized on analog volume regulator.

7.3.3.8 DAC Out Standard

It sets signal level of main output at the back of WANDLA to follow one of standards:

	WANDLA / WANDLA HP	WANDLA GoldenSound Edition	
RED - (Red Book standard) recently mostly used in hi-fi	It gives $2V_{RMS}$ (unbalanced output) and $4V_{RMS}$ (balanced	It gives 1.75 $V_{\rm RMS}$ (unbalanced output) and $3.5V_{\rm RMS}$	
equipment	output) for full scale sinus	(balanced output) for full	
	signal	scale sinus signal	
PRO - used in recording studios	lt gives +4dBu with 18dB	It gives +4dBu with 16dB	
and other professional	headroom on balanced	headroom on balanced	
equipment	output. It means +22dBu for	output. It means +20 dBu for	
	full scale sinus signal (~10 V_{_{\sf RMS}})	full scale sinus signal (~8V _{RMS})	

This setting does not apply to the headphone output of WANDLA HP.

7.3.3.9 DC Protection

Enable/disable DC protection on analogue output. Some tracks may contain a DC component that can adversely affect speakers or headphones. WANDLA automatically detects the DC component and cuts the signal from the output.

7.3.4 INPUTS



Contains inputs settings.

7.3.4.1 I2S Input Format

You can choose frame format of the I2S input. Possible values are:

- STD 32 bits standard I2S: word clock advanced by 1 bit and low level for left channel
- MSB 32 bits MSB/left-justified: no word clock advancement and high level for left channel

7.3.4.2 I2S Input DSD Pin

You can choose pin of I2S connector used to indicate DSD format. Please read the manual of your source device to find out which pin of I2S connector is used to indicate DSD format.

- None DSD will not be detected
- Pin 13
- Pin 14
- Pin 15
- Pin 16



7.3.4.3 [Input type] Input Safe Mode

Available input types in order of display: I2S / COAX / OPTO / AES / ARC

Sets the input into a safe mode, which makes WANDLA more tolerant to high-jittered signals in cost of slightly less reduction of the jitter. Enabling Safe Mode may help if you experience source compatibility issues such as dropouts or noise during playback.

7.3.5 VISUALS



Contains visual settings.

7.3.5.1 Display Brightness

Brightness of display in percent. It is relative to ambient brightness level or absolute when the ambient sensor is disabled.

7.3.5.2 Logo Brightness

Brightness of Ferrum logo in percent. It is relative to ambient brightness level or absolute when the ambient sensor is disabled.

7.3.5.3 Logo Stb Brightness

Brightness of the Ferrum logo in standby. It does not depend on the ambient sensor.

7.3.5.4 Ambient Sensitivity

Sensitivity of the ambient sensor used to change brightness of display and logo. Automatic brightness control can be also disabled.

7.3.5.5 Screen Auto Off Time

If you don't do anything for the selected time the screen will turn off. This feature can be disabled.

7.3.5.6 Home Return Time

If you don't do anything for the selected time the screen will return to Home Screen. This feature can be disabled.

7.3.6 CONTROL



Contains other settings.

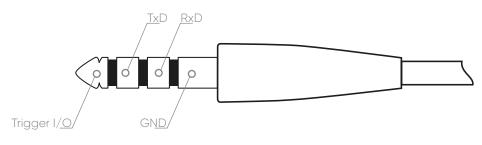


7.3.6.1 Trigger Direction

In this settings you can set direction of trigger:

- Input external device can turn on/off the WANDLA using trigger connection
- Output WANDLA can turn on/off external device using trigger connection

Note: Use 3.5mm TRRS jack for trigger connection. Using TS or TRS jack might damage trigger I/O. (See TRRS jack scheme <u>Fig. 5</u>).





Note: RxD and TxD signals are named with respect to the WANDLA's serial port. It means that RxD is WANDLA's input and TxD is WANDLA's output.

As of firmware version 1.2, a console is available that can be used in home automation systems to control basic WANDLA parameters and respond to changes in these parameters. For more information, see the documentation posted on our website: https://ferrum.audio/support/

7.3.6.2 Power-up Mode

These settings determine the WANDLA's behavior when it is powered up.

- Standby after power-up WANDLA stays in standby mode
- Working after power-up WANDLA starts working

<u>7.3.6.3 Auto Off</u>

Here you can set the time after which WANDLA will automatically turn off. For the device to turn off by itself after the set time, two conditions must be met:

- No incoming digital signal
- No interaction with the device

Note: The Auto Off function may not turn off the WANDLA even though the WANDLA displays NO SIGNAL on the screen. This is due to the fact the WANDLA can still receive data, because in some cases data is sent by transmitter even if nothing is played.

7.3.6.4 Auto Wake-Up

This function uses signal detector to turn on the WANDLA when it detects signal on digital input. It switches input to



the one which caused waking up. It can be disabled, enabled or enabled only when signal is detected on USB input. It doesn't influence CEC wake-up i.e. when you turn on TV it may turn on WANDLA independently of this setting.

7.3.6.5 Auto Input Selection

When there is no data send on the current input WANDLA scans other inputs and automatically switches to the input on which data is present.

There must be two conditions met for the correct operation of this function:

- There must be no data transmission on the currently active input (e.g., the cable must be disconnected) in some cases, even when playback is paused or stopped, the source may still send some data representing e.g. silence. Even when at the WANDLA's screen there is NO SIGNAL, WANDLA may still receive data from the source. Even silence in some cases is treated as a signal.
- There must be data applied on the other than WANDLA's current input after data will stop flowing on current one. If the data was present already on that non current input, the condition will not be met and input will not be switched. And again, some devices can send data that represent e.g. silence. In that case switching will occur, but WANDLA will display NO SIGNAL, and there will be silence. But still, data on that input was received.

It works only with digital inputs. It doesn't influence CEC input selection i.e. when you turn on TV it it may turn on WANDLA independently of this setting.

7.3.6.6 HP Amp Power WANDLA HP

You can choose power supply management mode for headphone amplifier.

- * Auto when jack is plugged in, headphone amplifier is powered up, when jack is removed headphone amplifier is powered down.
- * Always On WANDLA turns on headphone amplifier on wake up, and it is always on.

The headphone amplifier in WANDLA HP needs couple of seconds to be fully turned on. If the headphone amplifier will be turned on it will increase overall temperature of WANDLA HP enclosure.

Warning: WANDLA HP must be placed in a well-ventilated area. If a HYPSOS is used to power the WANDLA HP, it should be placed below the DAC.

7.3.5 ABOUT



<u>7.3.5.1 Contact</u>

Contains contact information to our company.

7.3.5.2 Device

It contains information about the currently installed firmware, serial numbers of the motherboard and SERCE module.



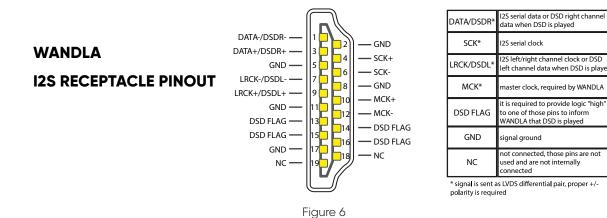
Note: The serial number of the converter is located on a sticker located on the bottom of the device.

7.3.5.3 Restore

Here you can reset WANDLA to factory settings.

8. I2S INPUT

If you want to use an I2S connection, make sure the I2S pinout of the WANDLA matches the source. Mismatched I2S pinouts can cause static/noise at the output. Excessive noise at the output can cause damage to speakers/ headphone drivers.



9. MQA

MQA feature is not available in the WANDLA GoldenSound Edition. The WANDLA GoldenSound Edition will not decode or unfold MQA files and will treat them as regular PCM files.



Authentication Types

The color of the small spot next to the MQA logo indicates if the MQA stream is detected.

The spot glows green to indicate that the unit is decoding and playing an MQA stream or file, and denotes provenance to ensure that the sound is identical to that of the source material.

It glows blue to indicate it is playing an MQA Studio file, which has either been approved in the studio by the artist/producer or has been verified by the copyright owner.

It glows magenta when WANDLA is receiving MQA signal which is unfolded by some upstream decoder or software where the media source is initially handled.



Note: For proper MQA decoding make sure your source can provide a bit perfect signal to the WANDLA. All digital inputs will accept MQA signal.

MQA and the Sound Wave Device are registered trade marks of MQA Limited \odot 2016

10. HEADPHONE ADAPTER

Headphone adapter balanced 4.4 mm TRRRS plug to 6.35 mm unbalanced TRS receptacle

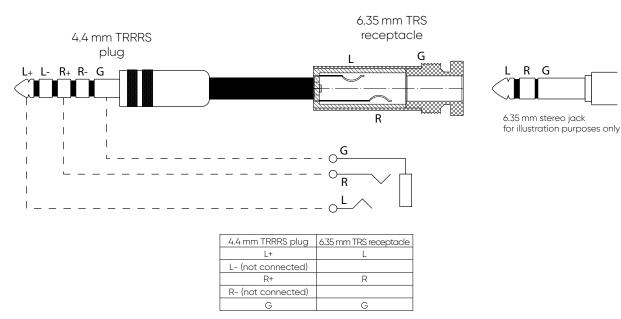


Figure 7

11. REMOTE CONTROL

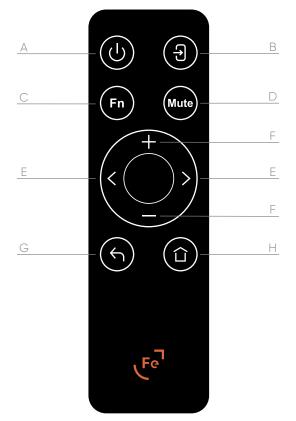


Figure 8

- A. On/Standby button
- B. Input selector button
- C. Function button not used now
- D. Mute button

- E. Left/right or change value buttons
- F. Volume buttons
- G. Back button
- H. Home screen button

12. USB AUDIO CONTROL PANEL

12.1 Driver and Application Installation

macOS

WANDLA will work driverless in macOS. Set WANDLA as a main audio output device in audio settings in macOS.

Linux

WANDLA will work driverless in Linux. Set WANDLA as a main audio output device in audio settings in Linux.

Windows

WANDLA will be automatically detected as an audio device and will appear in the Audio Settings menu in Windows, however we recommend installing our ASIO driver for the best audio experience.

You can download latest USB driver from our website: <u>https://ferrum.audio/support/</u>



After downloading the driver, install it according to the instructions displayed in the installer. Ferrum USB Audio Control Panel will also be installed along with the driver.

12.2 Control Panel

Ferrum USB Audio Control Panel will allow you to change some settings and get information about the device.

12.2.1 STATUS

Status of the device is shown in this tab. If it is detected you will see WANDLA name and motherboard serial number. Also current sample rate selection is displayed.

Note: The WANDLA serial number is located on a sticker underneath the unit.

12.2.2 FORMAT

It lists the available channels and bit depth.

12.2.3 BUFFER SETTINGS

- The Buffer Size (measured in samples) configures the amount of memory used by the software used for playback to buffer the audio for processing and playback.
 It determines the amount of latency or delay for audio to pass from the audio interface through the computer to headphones/speakers. Lower latency settings will take more system resources at a higher rate than higher latency settings.
- Safe Mode compensates for lengthy processing performed by a playback software in the ASIO callback. If safe mode is turned on, then the driver tolerates that a processing interval extends and overlaps with the next interval. It will extend the output latency.

Note: Ferrum recommends to stay at default settings.

12.2.4 INFO

Some information about the currently connected WANDLA.

12.2.5 ABOUT

Some information about the currently used Ferrum USB Audio Control Panel.



13. FIRMWARE UPDATE

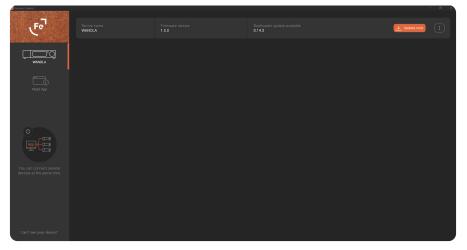
To update the firmware, please download the Ferrum Control application. We highly recommend installing ASIO drivers for better user experience.

Note: For macOS, there is no need to install the ASIO driver. WANDLA works driverless on macOS.

You can download the ASIO driver from our website: <u>https://ferrum.audio/support/</u>

The Ferrum Control app is available in the Microsoft Store and in the App Store – a direct link is also available on our site: <u>https://ferrum.audio/support/</u>

- 1. Open Ferrum Control app.
- 2. Connect WANDLA via USB cable to your computer and turn it on.
- 3. WANDLA will be displayed in the Ferrum Control app.





4. If the "Check for update" button is visible click on it to check if there is new firmware available. Alternatively you will see the "Update now" button. Click on it and then click on the "Start update" button to begin the update procedure.

P	ackage c	ontent			×
-					Action
		Bootloader	0.14.1	0.14.3	Update
		Firmware	1.5.0	1.5.0	Reinstall
		Clos	e What changed?	Start	

Figure 10



5. The Ferrum Control application will inform you when the firmware update process is complete. Click on the "Close" button to close the update window.

Installatio	on status		×
	Bootloader	Done 🛁	
	Firmware	Done 🥌	
		Installing firmware complete!	

Figure 11

6. After the update WANDLA will restart in mode set by Power-Up Mode setting. (Check the chapter: 7.3.6.2)

14. WANDLA GOLDENSOUND EDITION CONVERTING PLUGIN

14.1 Overview

The WANDLA GoldenSound Edition Converting Plugin is a software upgrade for the original WANDLA and WANDLA HP devices, enabling features such as Spatial Enhancement, Tube Mode, and Impact+. This plugin allows users to toggle between the original and GoldenSound Edition functionalities, enhancing the versatility of their audio equipment.

Note: Works with WANDLA and WANDLA HP.

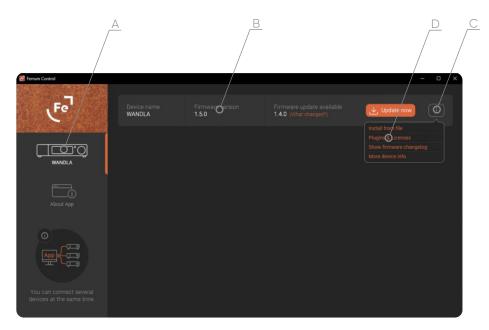
14.2 Installation and Deinstallation Procedure

14.2.1 INSTALLATION

- 1. Install Ferrum Control application from the Microsoft Store or Apple Store for macOS. Ensure it's version 1.2.0 or later.
- 2. Connect WANDLA to USB port of your computer, connect Power Supply to WANDLA.
- 3. Open Ferrum Control (Fig.12).
 - A. Select WANDLA.

B. Check Firmware. Ensure WANDLA's firmware is version 1.5.0 or later. You can update it at this point by clicking "Update now" and following the procedure.

- C. Click button to see more options.
- D. Select "Plugins & licenses".





4. Click + button to add license (Fig.13).

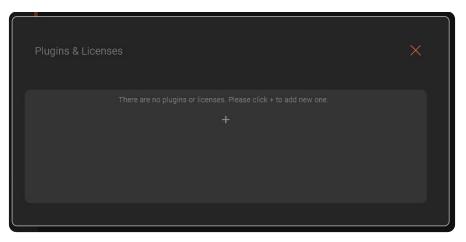
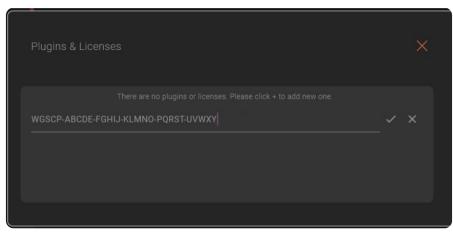


Figure 13

5. In the field "Enter license key" (Fig.14), paste or put the license key and click 🖌 for accept (Fig.15)

Plugins & Licenses	×
There are no plugins or licenses. Please click + to add new one. Enter license key -	×

Figure 14



- Figure 15
- 6. The license should be validated, and you'll be asked to install the plugin into device (Fig. 16).

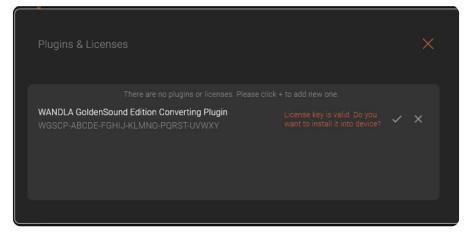


Figure 16

7. Click for accept and wait for the installation to complete, including a device restart (Fig.17).

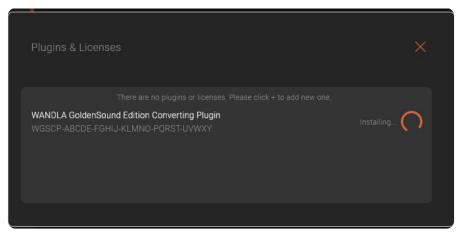


Figure 17

8. The plugin should be successfully installed, and you can enjoy the new features on your WANDLA now (Fig.18).

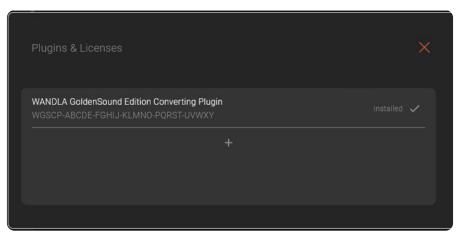


Figure 18



14.2.1 DEINSTALLATION

- 1. Repeat steps 1-4 from the installation procedure.
- 2. Click the \times button and confirm the deinstallation.
- 3. Wait for the deinstallation process to complete, which includes restarting the device.
- 4. You have successfully removed the plugin from the device.

Important notes:

- 1. The plugin can be installed and uninstalled as many times as you want.
- 2. The license key can be used only with one WANDLA.
- 3. Installation and uninstallation require an internet connection to process license activation and deactivation.
- 4. To manage plugins, the minimum firmware version is 1.5.0, and the minimum Ferrum Control version is 1.2.0.

15. TECHNICAL SPECIFICATION

- DAC chip: ESS Sabre ES9038PRO
- WANDLA resolution: 768 kHz/32-bit, DSD 512
- Digital inputs:
 - AES/EBU (up to PCM 192 kHz/24-bit, DoP 64)
 - Optical S/PDIF (up to PCM 96 kHz/24-bit guaranteed; should work up to PCM 192 kHz/24-bit and DoP 64 – depends of user's optical cable and transmitter)
 - Coaxial S/PDIF (up to PCM 192 kHz/24-bit, DoP 64)
 - USB (up to PCM 768kHz/32-bit, DSD 512, DoP 256)
 - ARC (up to PCM 192 kHz/24-bit), TV input with CEC
 - ◆ I2S (up to PCM 768 kHz/32-bit, DSD 512, DoP 256), PS Audio® compatible
- MQA decoder and renderer on all digital inputs not available in WANDLA GoldenSound Edition
- Analog inputs: RCA
- Analog input maximum voltage: 9.5 V_{RMS}, 2-3.5 V_{RMS} recommended
- Analog input impedance: 47kΩ
- Line outputs: balanced XLR; unbalanced RCA
- Volume control: analog with bypass option / digital for DAC operation only
- Output level: V_{out} @ 0 dBFS, 1kHz sine:
 - RCA: RED: 2V_{RMS} (WANDLA & WANDLA HP); 1.75V_{RMS} in WANDLA GoldenSound Edition
 PRO: 5V_{RMS} (WANDLA & WANDLA HP); 4V_{RMS} in WANDLA GoldenSound Edition
 - XLR: RED: 4V_{RMS} (WANDLA & WANDLA HP); 3.5V_{RMS} in WANDLA GoldenSound Edition
 - PRO: 10 $\rm V_{RMS}$ (WANDLA & WANDLA HP); 8 $\rm V_{RMS}$ in WANDLA GoldenSound Edition
- Frequency response analog inputs: 10 Hz 200 kHz +/-0.1dB
- DAC THD: -121 dB (0.00009%); THD+N: -115 dB (unweighted)
- Analog input THD: -123 dB @ 2V_{RMS} output level
- Dynamic range analog: 127 dB (A-weighted)
- Dynamic range digital:
 - 122 dB (A-weightened, WANDLA & WANDLA HP)
 - 119 dB (A-weightened, WANDLA GoldenSound Edition)
- Crosstalk: -120 dB for 1kHz, better than -100 dB for 20 Hz 20 kHz
- Output impedance unbalanced: 22Ω
- Output impedance balanced: 44Ω
- HP output available only in WANDLA HP
 - THD balanced:
 - 0.00016% / -116 dB, 10 mW into 50 Ω 0.00020% / -114 dB, 100 mW into 50 Ω
 - THD unbalanced:
 0.00022% / -113 dB, 10 mW into 50 Ω
 - 0.00022% / -113 dB, 100 mW into 50 Ω
 - Output Power Single Ended: 1W into 50Ω
 - Output Power Balanced: 3.5 W into 50 Ω

- Dyn. Range: 122 dB
- HP Output impedance: 0.5Ω unbalanced; 1Ω balanced
- Power consumption:
 - 12 W idle / 15 W max (WANDLA & WANDLA GoldenSound Edition)
 - 13 W idle / 35 W max (WANDLA HP)
- Power inputs: 5.5/2.5 mm DC connector center positive; proprietary FPL 4-pin DC connector (FPL); 22-30 V_{DC}
- Power adapter: $100-240 V_{AC}$ to $24 V_{DC}$
- Dimensions (W x D x H): 21.7 cm x 20.6 cm x 5 cm / 8.6" x 8.1" x 2.0"
- Weight:
 - 1.8 kg / 3.9 lb (WANDLA & WANDLA GoldenSound Edition)
 - 1.90 kg / 4.19 lb (WANDLA HP)

16. WARRANTY

Each individual WANDLA undergoes comprehensive quality control and a complete test before shipping.

This headphone amplifier is guaranteed by Ferrum to the owner or holder of the original proof of purchase against defects in workmanship and materials used in manufacture for a period of three years from the date of purchase and in the country of purchase.

If you suspect that your product is faulty, please contact the place of purchase or you contact Ferrum support. Prior to shipping for warranty services the customer or dealer must obtain an RMA number from Ferrum for warranty services. Units sent without an RMA number will not be accepted.

Proof of purchase in the form of a bill of sale or received invoice, which is evidence that this product is within the warranty period, must be presented to obtain warranty service. This warranty is void and inapplicable if the factory applied serial number has been altered or defaced from this product. Faults due to customer misuse, unauthorized modifications or accidents are not covered by this warranty.

In case of need to send the WANDLA for service please pack the product very carefully, preferable in the original packing, to be sure no damage can be done during shipment.

Ferrum is not responsible for accessories, items left in the packaging and the box in which the device has arrived for service. Ferrum reserves the right to use a replacement box if necessary.

17. CONTACT FERRUM

In case of questions, problems or suggestions regarding its form or contents, please contact us via our support system available on our website: <u>https://ferrum.audio/support/</u>

18. WARNING

Excessive sound pressure from speakers and headphones can cause hearing loss. In order to use this product



This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

All interface cables used to connect peripherals must be shielded in order to comply with the limits for a digital device pursuant to Subpart B of Part 15 of FCC Rules.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This product with the CE marking complies with the EMC Directive issued by the Commission of the European Community. Compliance with this directive implies conformity to the following European standards:

- EN55103-1 : Electromagnetic Interference (Emission)
- EN55103-2 : Electromagnetic Susceptibility (Immunity)

This product is intended for use in the following Electromagnetic Environments: E1 (residential), E2 (commercial and light industrial), E4 (controlled EMC environment, ex. TV studio).

19. INFORMATION ON DISPOSAL FOR USERS OF WASTE ELECTRICAL & ELECTRONIC EQUIPMENT (PRIVATE HOUSEHOLDS)

The Wheelie Bin symbol on the products and/or accompanying documents means that used electrical and electronic products should not be mixed with general household waste. Disposing of this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment. To properly dispose harmful substances and recycle the product, the user is obliged to return it at the point of collection of electrical and electronic equipment waste. For more information please contact your local authorities, waste disposal units or retailer.