

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 HYPSONOS, 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

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WANDLA



WANDLA GoldenSound Edition

The unique functionalities available only in the WANDLA GoldenSound Edition are marked in this manual with the icon



WANDLA HP

The unique functionalities available only in the WANDLA HP are marked in this manual with the icon



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)
- Integrated headphone amplifier (WANDLA HP only)

4. WANDLA Overview

4.1 Front Panel

Label	Component
A	Ferrum logo
B	Touchscreen
C	IR receiver and ambient light sensor
D	Volume knob
E	4.4 mm TRRRS output jack (WANDLA HP only)



Figure 1

4.2 Back Panel

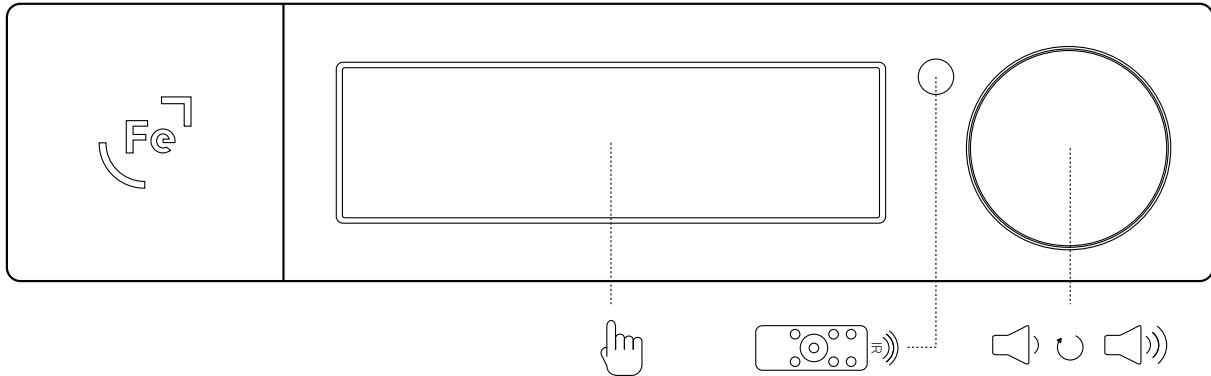
Label	Connector	Type
A	Analog output	XLR (balanced)
B	Analog output	RCA (unbalanced)
C	Analog input	RCA
D	AES/EBU input	XLR
E	S/PDIF optical input	TOSLINK
F	S/PDIF coaxial input	RCA
G	USB input	Type-C
H	ARC input	—
I	I2S input	—
J	Trigger input/output	3.5 mm TRRS jack
K	Ferrum Power Link DC input	FPL 4-pin (HYPSON compatible)
L	5.5/2.5 mm DC power input	Centre-positive DC connector



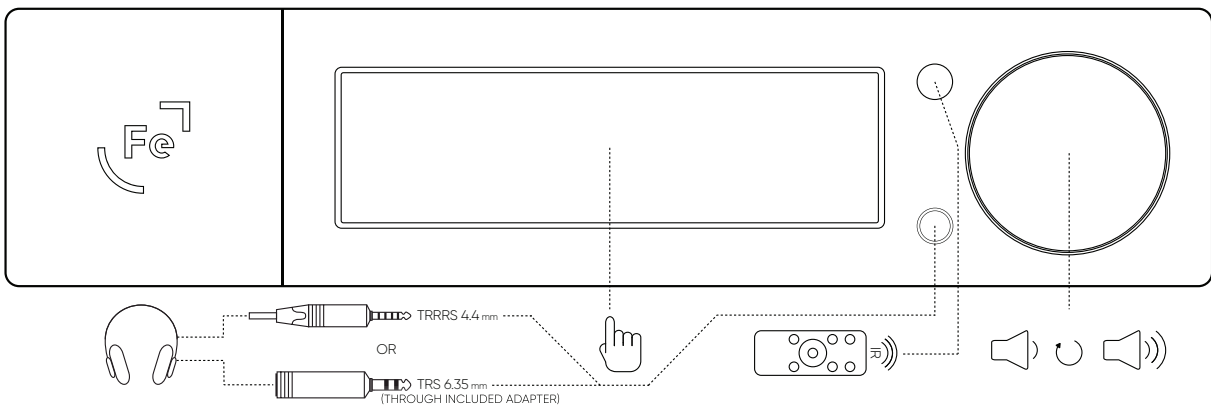
Figure 2

5. Connecting the WANDLA

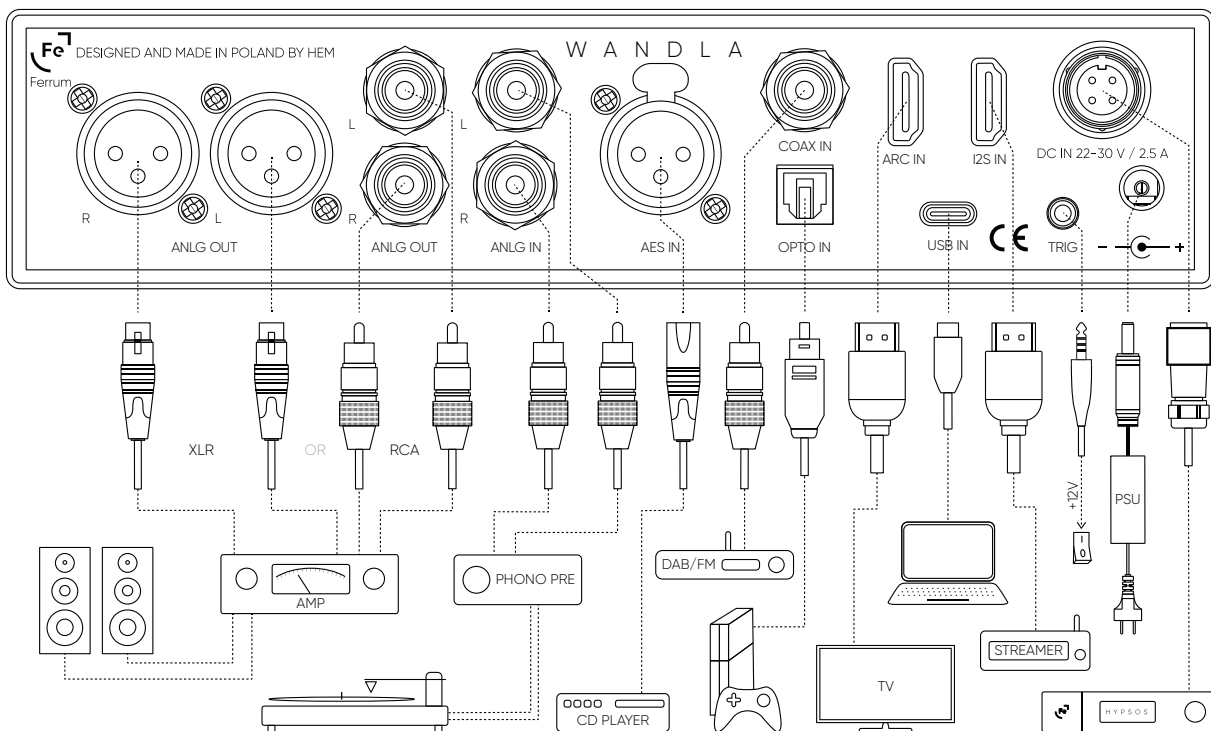
Note: Please connect all signal cables before connecting DC cable/switching on the WANDLA.



WANDLA and WANDLA GoldenSound Edition front panel



WANDLA HP front panel



WANDLA rear panel and connecting diagram

Figure 3

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.

To put WANDLA in standby mode touch Menu button



and then select ON/Standby icon.



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

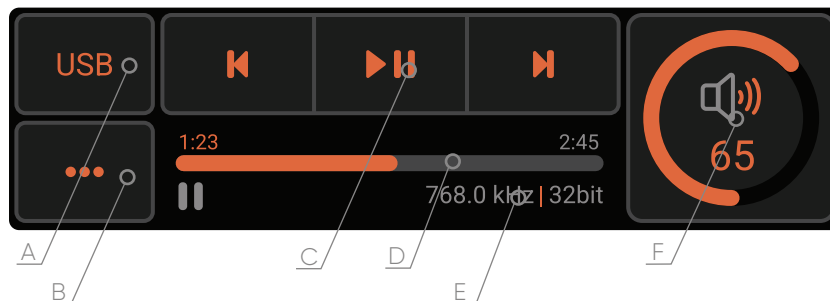


Figure 4

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.

Touch and hold – a popup menu will then appear, where you can either set a particular input as a favorite (switching inputs with the remote control then works differently) or go to the settings of a particular input.

B. Menu

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

C. Transport buttons / Track metadata

Allows to control music playback on supported USB sources. When WANDLA is connected to the USB source that supports metadata display the transport buttons will hide and display artist and song name. Touch or swipe this part of the screen to reveal transport buttons.

When metadata is displayed, you have to swipe left/right to use previous/next – just touching it does only play/pause. When there is no metadata, dragging works too.

It is a part of our Ferrum Streaming Control Technology (FSCT) – more about that in the next chapter.

When other input is selected the transport buttons will disappear.

D. Progress bar

Displays a visual element that indicates the current position of the song being played relative to its total length. It is a part of our Ferrum Streaming Control Technology (FSCT).

E. Data format

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

F. 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.

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.

G. Status info

It shows if the incoming signal is playing or not. Also here a DC protection indicator is displayed when a DC component is detected in the incoming signal.

7.2 Ferrum Streaming Control Technology (FSCT)

Function

Ferrum Streaming Control Technology (FSCT) enables the user to control playback of a streamer which WANDLA is connected to via USB directly from the WANDLA device and its remote control. FSCT also provides metadata display on the WANDLA touch screen.

When FSCT is active, the WANDLA touch screen and remote control can be used to:

- Play and pause the current track
- Skip to the next track
- View current track metadata (title and artist)
- View track progress via a timeline indicator (The progress bar will not work if the player does not send progress information)

Display Behavior

When FSCT is in use, the WANDLA screen displays:

- Track title
- Artist name
- Playback progress bar (Progress is not always available, some programs do not report it to the system, and then the progress bar remains gray and there are no time indicators.)

Display information is optimized for visibility at close and medium viewing distances.

Compatibility

FSCT is compatible with devices running the following operating systems:

- macOS (installed FSCT driver is required for metadata display)
- Windows (installed FSCT driver is required for metadata display)

- Volumio OS (with FSCT-compatible plugin)

Partial support may be available on other platforms, streamers, or operating systems depending on their individual implementation of media control and metadata interfaces.

Driver Requirement

For correct operation of FSCT on Windows and macOS systems, the Ferrum Streaming Control Technology Driver must be installed. The driver is available via the Ferrum website.

Firmware Requirement

FSCT is included in WANDLA firmware version 2.0.0 and later. To enable FSCT:

1. Install the firmware using the Ferrum Control App (available for macOS and Windows).
2. Install the FSCT driver on Windows (reset your computer after installation) or macOS.

Once installed, FSCT functionality is active by default. No additional configuration is required.

7.3 Buttons



Return to the previous screen



Tooltip/info



Close/cancel



Back to main screen



Confirm



Left/right arrows - changes selected value



Slider - changes selected value



Not selected as favourite input / selected as a favourite input.
This button is displayed when you press and hold any input on the inputs list.



This button resets the function to factory settings.

7.4 Menu Structure

7.4.1 STANDBY

This button puts WANDLA in standby mode.



7.4.2 GOLDENSOUND EXCLUSIVE

Contains WANDLA GoldenSound Edition exclusive audio settings.



7.4.2.1 Impact+

Impact+ applies a two-band EQ to increase the level of bass content, and provide an improved perception of "punch" for dynamic elements such as kick drums. Thanks to profile selection it can be used to compensate dynamic drives as well.

Profile

You can choose one of the following Impact+ profiles in order to tailor the bass response to your preferences.

Profiles characteristics:

- Reference — Balanced and neutral bass response. Same as in an original GoldenSound Edition version.
- Reference+ — Slightly enhanced bass response to avoid overboosted mid-bass.
- Smooth — Similar to Reference, but with less punch boost.
- Kick+ — Enhanced bass response for a more powerful kick drum.
- DD-Comp — Linearises the natural bass rolloff of dynamic driver headphones.
- DD-Comp+ — Linearises the natural bass rolloff of dynamic driver headphones, with added emphasis to kick drums.
- Sub-Bass — Optimized for deep bass frequencies.

Level

Allows to adjust bass boost level, either reduced even to 10% or increased up to 130%.

ON/OFF switch

7.4.2.2 Tube Mode

Tube Mode enables or disables vacuum tube emulation in WANDLA by adding carefully tuned harmonic distortion. When enabled, it delivers a warmer, richer sound; when disabled, the signal remains clean and fully transparent.

Profile

Tube Profile selects one of several predefined tube profiles, each offering a distinct harmonic character and tonal coloration. 2nd-only mode is artificial tube simulation with only the second harmonic distortion added. It is the same mode which was used in the original GoldenSound Edition. Other profiles emulate the real harmonic distortion behaviour of various popular tube models.

Level

Allows adjustment of the strength of tube emulation, either reduced even to 10% or increased up to 200%. Strength can be adjusted up to 200%, though 100–150% is recommended as 200% may cause less desirable sound alteration particularly with bass-heavy content. 100% is the default level, which aligns with specific tube characteristics or original GoldenSound Edition in the case of 2nd-only mode.

ON/OFF switch

7.4.2.3 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.

Mode

Selects the spatial enhancement mode for the audio processing:

- Speaker — Optimized for speaker systems.
- HP — Optimized for headphones. Independently of their names both options can be used in speaker and headphone scenarios depending on the specific audio setup and listening environment.

T-Comp

Enables transient compensation, an alternative spatial enhancement algorithm with additional transient content processing to provide a more natural sound on some headphones.

ON/OFF switch

7.4.2.4 License Details

It contains information about the license — the name and the license key. WANDLA GoldenSound Edition has an installed permanent license which cannot be disabled. When GoldenSound features were activated in WANDLA or WANDLA HP using the GoldenSound Edition Converting Plugin (purchased separately), the license can be disabled using the Disable button 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.

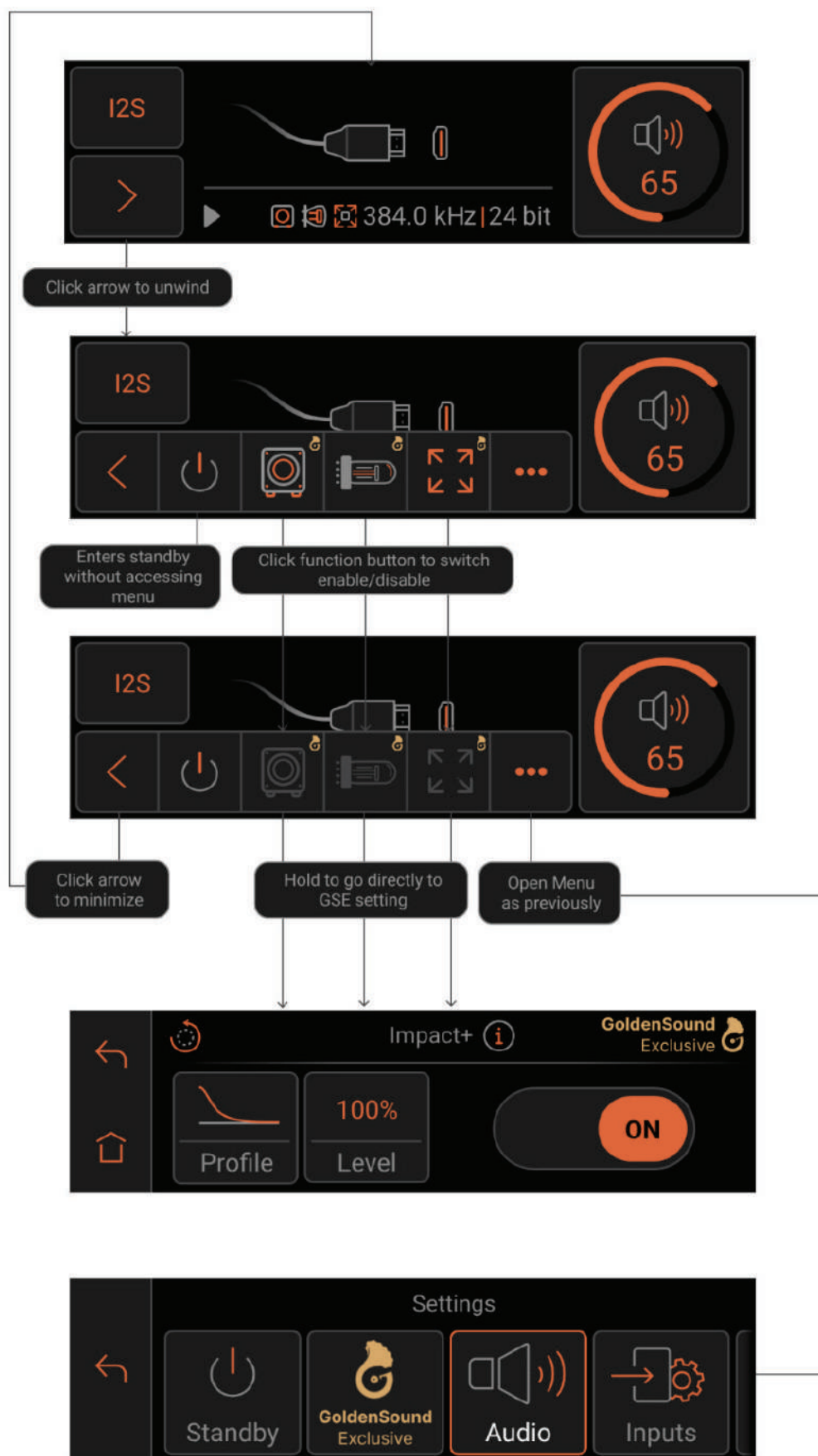
Note: Below graphic illustrates the updated user interface and control workflow introduced with the GoldenSound Edition Gen 2 (GSE 2) plugin. A new 'drawer' mechanism has been implemented on the main screen, replacing the previous menu entry and providing quick access to key functions. When expanded, the drawer gives access to Power (Standby), Menu, and direct control of GoldenSound effects. A short press on an effect icon toggles it On/Off, while a long press opens the detailed settings menu for that specific effect.

The main screen now also includes status icons indicating whether individual GoldenSound effects are active (On/Off). Additionally, dedicated effect icons have been added to the graphical menu interface.

GSE 2 introduces enhanced control over: Impact+ (profile selection and level adjustment), Tube Mode (tube type selection and intensity adjustment), Spatial Enhancement (separate Speaker and Headphone modes, independent On/Off toggle, and a new Transient Compensation (T-Comp) mode).

These changes are designed to streamline operation and provide faster, more intuitive access to key audio settings.

To take advantage of the new features introduced in GSE Gen 2, the WANDLA must be updated to firmware version 2.1 or later.



7.4.3 AUDIO



Contains audio settings.

7.4.3.1 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)

7.4.3.2 Upsampling

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

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

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

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

7.4.3.3 Bypass

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.

7.4.3.4 Theater Bypass

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

7.4.3.5 Output Balance

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

7.4.3.6 Digital Input Trim

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

7.4.3.7 Analog Input Gain

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

7.4.3.8 DAC Output Standard

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

Standard	WANDLA / WANDLA HP	WANDLA GoldenSound Edition
RED (Red Book standard, mostly used in hi-fi equipment)	2 V RMS (unbalanced) and 4 V RMS (balanced) for full scale sinus signal	1.75 V RMS (unbalanced) and 3.5 V RMS (balanced) for full scale sinus signal
PRO (used in recording studios and other professional equipment)	+4 dBu with 18 dB headroom on balanced output. Means +22 dBu for full scale sinus signal (~10 V RMS)	+4 dBu with 16 dB headroom on balanced output. Means +20 dBu for full scale sinus signal (~8 V RMS)

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

7.4.3.9 Main Output Phase Inversion

Enables or disables phase inversions on the main outputs (XLR and RCA). This function is available for digital inputs only and does not affect the analogue input.

7.4.3.10 DC Protection

Enable/disable DC protection on analogue output. Some tracks may contain a DC component. WANDLA automatically detects the DC component and cuts the signal from the output.

7.4.4 INPUTS



Contains inputs settings.

7.4.4.1 USB

- USB Input Favourite

Tags the input as a favorite, making it quicker to access. Multiple inputs can be tagged as favorites.

- USB Jitter Suppressor

This setting allows you to adjust the USB input jitter suppression algorithm. Higher values provide better performance but may cause compatibility issues with some source devices. Lower values provide better immunity to signal quality issues but with slightly reduced performance.

- USB DSD Jitter Suppressor

This setting allows you to adjust the USB input jitter suppression algorithm for DSD audio. Higher values provide better performance but may cause compatibility issues with some source devices. Lower values provide better immunity to signal quality issues but with slightly reduced performance.

7.4.4.2 OPTICAL

- Input Favourite

Tags the OPTICAL input as a favorite, making it quicker to access. Multiple inputs can be tagged as favorites.

- Jitter Suppressor

This setting allows you to adjust the OPTICAL input jitter suppression algorithm. Higher values provide better performance but may cause compatibility issues with some source devices. Lower values provide better immunity to signal quality issues but with slightly reduced performance.

- Optical DSD Jitter Suppressor

This setting allows you to adjust the OPTICAL input jitter suppression algorithm for DSD audio. Higher values provide better performance but may cause compatibility issues with some source devices. Lower values provide better immunity to signal quality issues but with slightly reduced performance.

7.4.4.3 COAXIAL

- Input Favourite

Tags the COAXIAL input as a favorite, making it quicker to access. Multiple inputs can be tagged as favorites.

- Jitter Suppressor

This setting allows you to adjust the COAXIAL input jitter suppression algorithm. Higher values provide better performance but may cause compatibility issues with some source devices. Lower values provide better immunity to signal quality issues but with slightly reduced performance.

- Coaxial DSD Jitter Suppressor

This setting allows you to adjust the COAXIAL input jitter suppression algorithm for DSD audio. Higher values provide better performance but may cause compatibility issues with some source devices. Lower values provide better immunity to signal quality issues but with slightly reduced performance.

7.4.4.4 AES

- Input Favourite

Tags the AES input as a favorite, making it quicker to access. Multiple inputs can be tagged as favorites.

- Jitter Suppressor

This setting allows you to adjust the AES input jitter suppression algorithm. Higher values provide better performance but may cause compatibility issues with some source devices. Lower values provide better immunity to signal quality issues but with slightly reduced performance.

- AES DSD Jitter Suppressor

This setting allows you to adjust the AES input jitter suppression algorithm for DSD audio. Higher values provide better performance but may cause compatibility issues with some source devices. Lower values provide better immunity to signal quality issues but with slightly reduced performance.

7.4.4.5 ARC

- Input Favourite

Tags the ARC input as a favorite, making it quicker to access. Multiple inputs can be tagged as favorites.

- Jitter Suppressor

This setting allows you to adjust the ARC input jitter suppression algorithm. Higher values provide better performance but may cause compatibility issues with some source devices. Lower values provide better immunity to signal quality issues but with slightly reduced performance.

7.4.4.6 I2S

- Input Favourite

Tags the I2S input as a favorite, making it quicker to access. Multiple inputs can be tagged as favorites.

- Frame Format

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

- Standard — standard I2S: word clock advanced by 1 bit and low level for left channel
- MSB Justified — MSB/left-justified: no word clock advancement and high level for left channel

- PCM Slot Size

You can choose the PCM slot size of the I2S input. Possible values are: 16 bits / 24 bits / 32 bits

- DSD Detect Method

You can choose the DSD detection method for the I2S input. Possible values are:

- None — DSD detection is disabled. Only PCM data will be processed.
- Auto — DSD detection is based on the I2S signal.
- Pin 13 through 16 — Respective pin of the I2S connector used to indicate DSD format. Please read the manual of your source device to find out which pin is used.

- DSD Channel Assignment

You can choose a channel assignment for the I2S input. Possible values are:

- Left on LRCK — The left DSD channel is transmitted over the I2S LRCK line, while the right DSD channel is transmitted over the I2S DATA line.
 - Left on DATA — The left DSD channel is transmitted over the I2S DATA line, while the right DSD channel is transmitted over the I2S LRCK line.
- LRCK Polarity

You can choose the LRCK signal polarity of the I2S input. Possible values are:

- Pos on Pin 9 — Normal polarity: the positive line (LRCK+) is on pin 9, and the negative line (LRCK-) is on pin 7.
 - Pos on Pin 7 — Inverted polarity: the positive line (LRCK+) is on pin 7, and the negative line (LRCK-) is on pin 9.
- SCK Polarity

You can choose the SCK signal polarity. Possible values are:

- Pos on Pin 4 — Normal polarity: SCK+ on pin 4, SCK- on pin 6.
 - Pos on Pin 6 — Inverted polarity: SCK+ on pin 6, SCK- on pin 4.
- DATA Polarity

You can choose the DATA signal polarity. Possible values are:

- Pos on Pin 3 — Normal polarity: DATA+ on pin 3, DATA- on pin 1.
 - Pos on Pin 1 — Inverted polarity: DATA+ on pin 1, DATA- on pin 3.
- Sync Method

You can choose a synchronization method for the I2S input. Possible values are:

- MCK Line — synchronization based on the MCK line. The source device must provide a master clock signal at one of the following frequencies: 22.5792 MHz, 24.576 MHz, 45.1584 MHz or 49.152 MHz. This synchronization method ensures the best performance.
 - Recover — uses an internally implemented clock recovery mechanism. Master clock signal is not used and can be absent on the I2S connector.
- Jitter Suppressor

This setting allows you to adjust the I2S input jitter suppression algorithm. Higher values provide better performance but may cause compatibility issues with some source devices. Lower values provide better immunity to signal quality issues but with slightly reduced performance.

- I2S DSD Jitter Suppressor

This setting allows you to adjust the I2S input jitter suppression algorithm for DSD audio. Higher values provide better performance but may cause compatibility issues with some source devices. Lower values provide better immunity to signal quality issues but with slightly reduced performance.

7.4.4.7 ANALOG

- Analog Input Favourite

Tags the input as a favorite, making it quicker to access. Multiple inputs can be tagged as favorites.

7.4.5 VISUALS



Contains visual settings.

7.4.5.1 Display Brightness

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

7.4.5.2 Logo Brightness

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

7.4.5.3 Logo Stb Brightness

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

7.4.5.4 Ambient Sensitivity

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

7.4.5.5 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.

7.4.5.6 Home Screen Mode

Defines the behavior of manual and automatic navigation when returning to the Home screen. Possible values: Remote — Navigation will return to a simplified Home screen designed for remote usage; Last Active — Navigation will return to the last Home screen activated by the user.

7.4.6 CONTROL



Contains other settings.

7.4.6.1 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 3.5 mm TRRS jack for trigger connection. Using TS or TRS jack might damage trigger I/O.

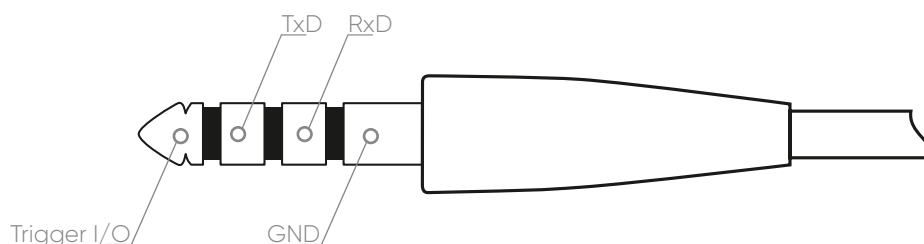


Figure 5

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/>

7.4.6.2 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

7.4.6.3 Auto Standby

For the unit to enter standby after the set time, two conditions must be met:

- No incoming digital signal
- No interaction with the device

Note: The absence of signal indication on the WANDLA's screen does not mean that WANDLA can go to standby. 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.

7.4.6.4 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.

7.4.6.5 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.
- 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.

It works only with digital inputs. It doesn't influence CEC input selection.

7.4.6.6 HP Amp Power



You can choose power supply management mode for headphone amplifier. (WANDLA HP)

- 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 a 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 HYPSON is used to power the WANDLA HP, it should be placed below the DAC.

7.4.6.7 USB Vol. Control

You can choose the preferred volume synchronization method between WANDLA and host (USB source). Possible values are:

- Master — volume on WANDLA is synced with volume on the host side. Changing volume on host causes volume setting change on WANDLA and changing it on WANDLA causes changing it on host. It works even when USB input is not selected on WANDLA in order to allow you to use USB connection as a volume control for other inputs as well.
- USB-In Only — same as master, but it works only when USB input is selected on WANDLA.
- Chained — pre-regulation on USB input only. The volume from the host is added to the volume set on WANDLA to simulate the volume regulation on the host side, but the actual regulation is done on the WANDLA volume controller (digital or analog). It works only when USB input is selected on WANDLA.

Note: This feature works on Windows, Linux, macOS, and iOS/iPadOS.

7.4.6.8 FN Button

You can choose which setting will be controlled by the FN button on the remote. Possible values:

- Volume Control Type
- Upsampling filter
- Impact+ (GoldenSound Edition only)
- Tube Mode (GoldenSound Edition only)
- Spatial Enhancement (GoldenSound Edition only)

7.4.7 ABOUT



- Contact — Contains contact information to our company.
- Device — It contains information about the currently installed firmware, serial numbers of the motherboard and SERCE module.
- Restore — Here you can reset WANDLA to factory settings.

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

8. I2S Input

Warning: 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.

WANDLA

I2S RECEPTACLE PINOUT

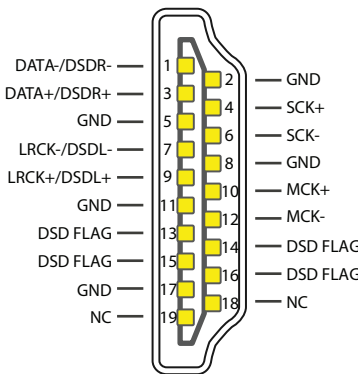


Figure 6

DATA/DSDR*	I2S serial data or DSD right channel data when DSD is played
SCK*	I2S serial clock
LRCK/DSDL*	I2S left/right channel clock or DSD left channel data when DSD is played
MCK*	master clock, required by WANDLA
DSD FLAG	it is required to provide logic "high" to one of those pins to inform WANDLA that DSD is played
GND	signal ground
NC	not connected, those pins are not used and are not internally connected

* signal is sent as LVDS differential pair, proper +/- polarity is required

9. MQA

Note: 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.

Indicator colour	Meaning
Green	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.
Blue	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.
Magenta	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. You can find more info about MQA at: <https://mqalabs.com>

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

10. Headphone Adapter (WANDLA HP)

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

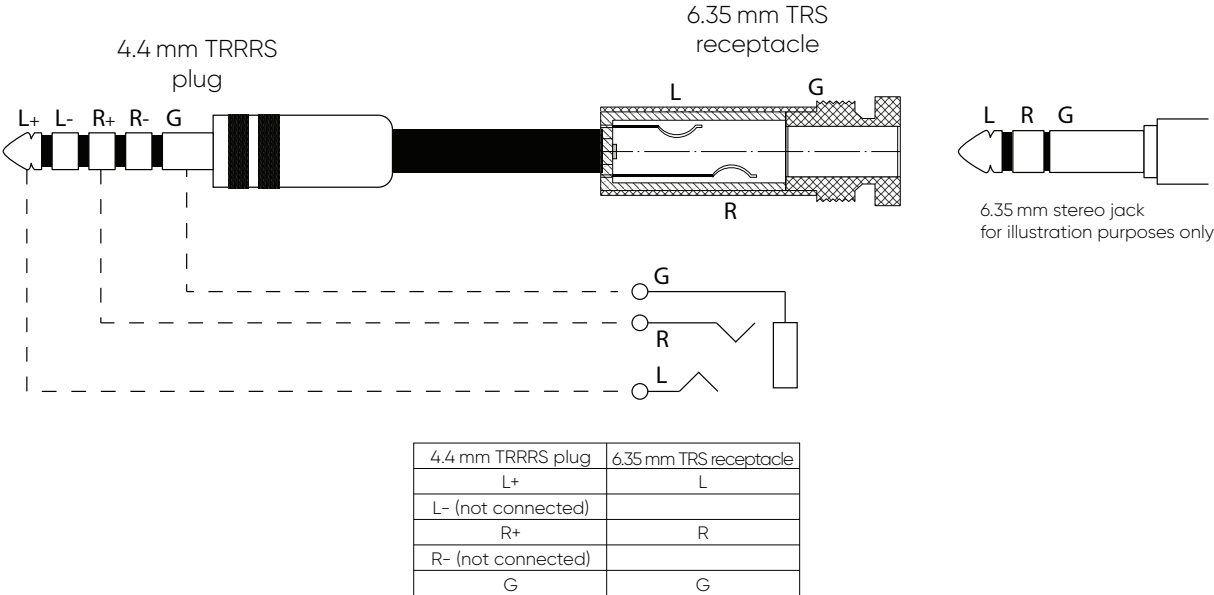


Figure 7

11. Remote Control

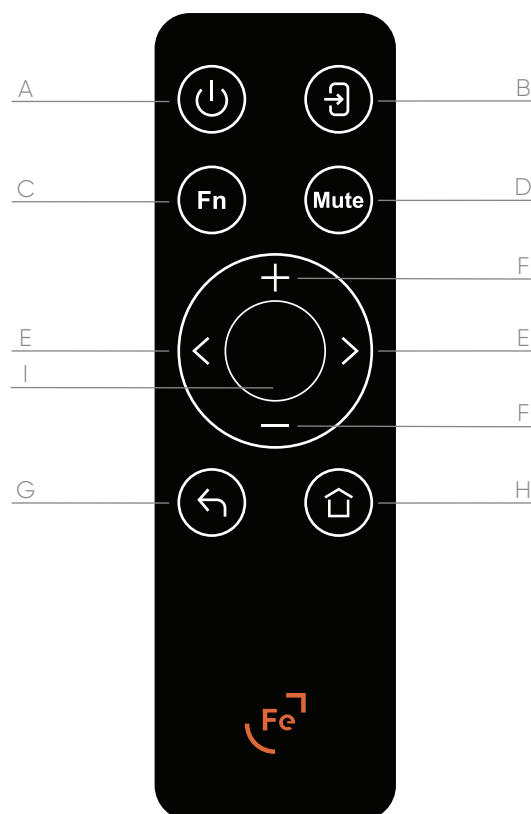


Figure 8

Button	Function
A – On/Standby	Toggle power on or standby
B – Input selector	If any input is set as favorite, cycles only through favorite inputs
C – FN	Controls the setting selected in the FN Button menu (Section 7.4.6.8)
D – Mute	Mute button
E – Left/Right	Left/right or change value. On home screens perform transport control (previous, play/pause, next)
F – Volume	Volume buttons
G – Menu/Back	Menu / back
H – Home switch	Switches between the two home screens
I – Play/Pause	Play/pause

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 the latest USB driver from our website: <https://ferrum.audio/support/>

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

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.

Note: Ferrum recommends to stay at default settings.

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: <https://ferrum.audio/support/>

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

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.

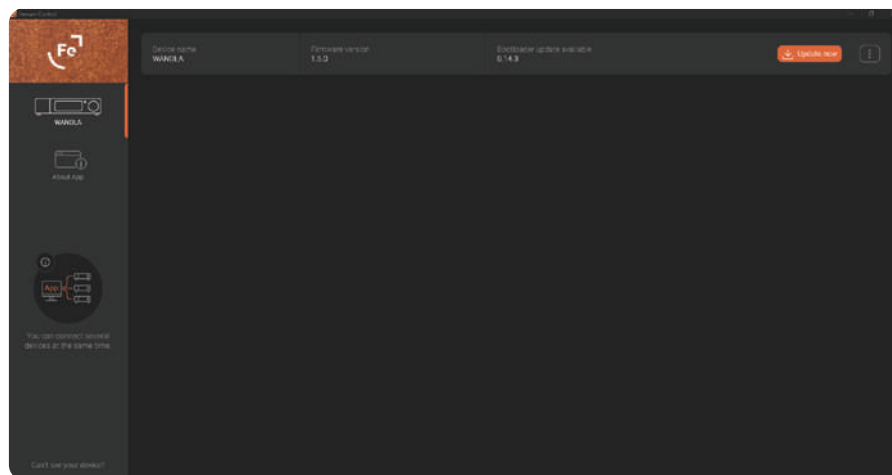


Figure 9

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.

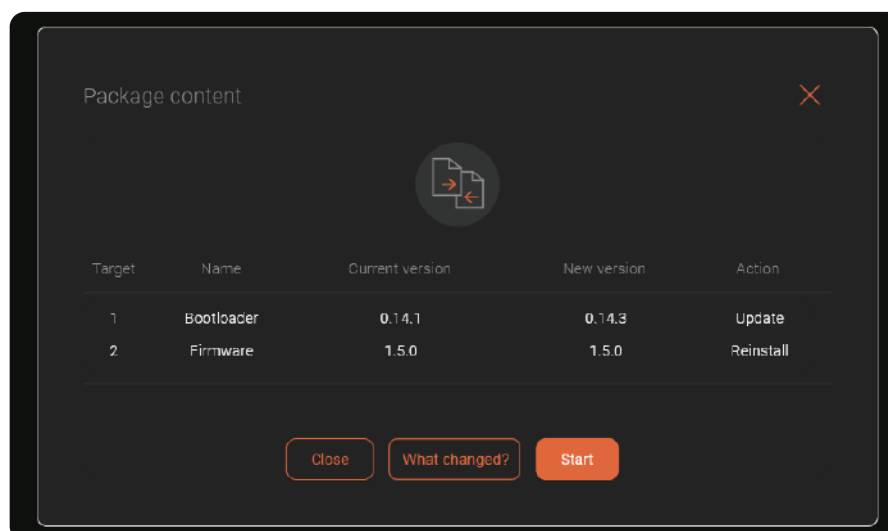


Figure 10

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.

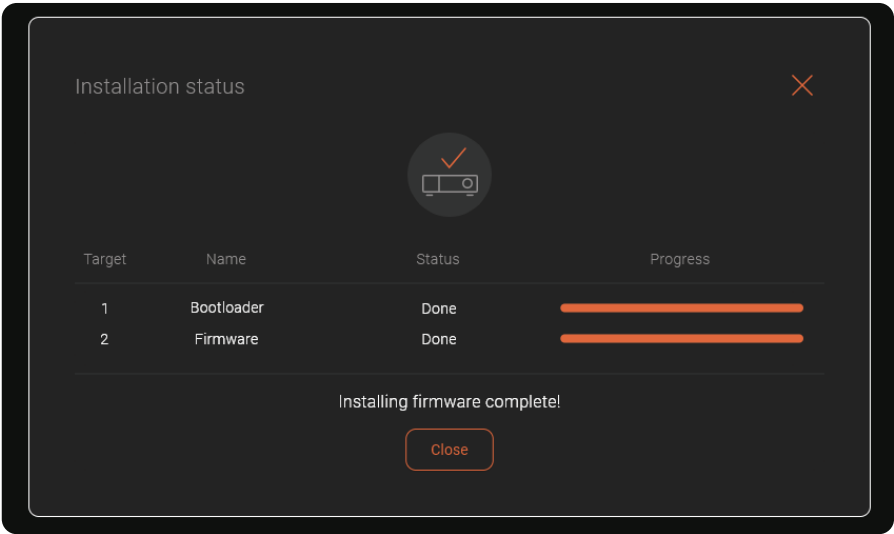


Figure 11

6. After the update WANDLA will restart in mode set by Power-Up Mode setting (Check the chapter: 7.4.6.2).

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".

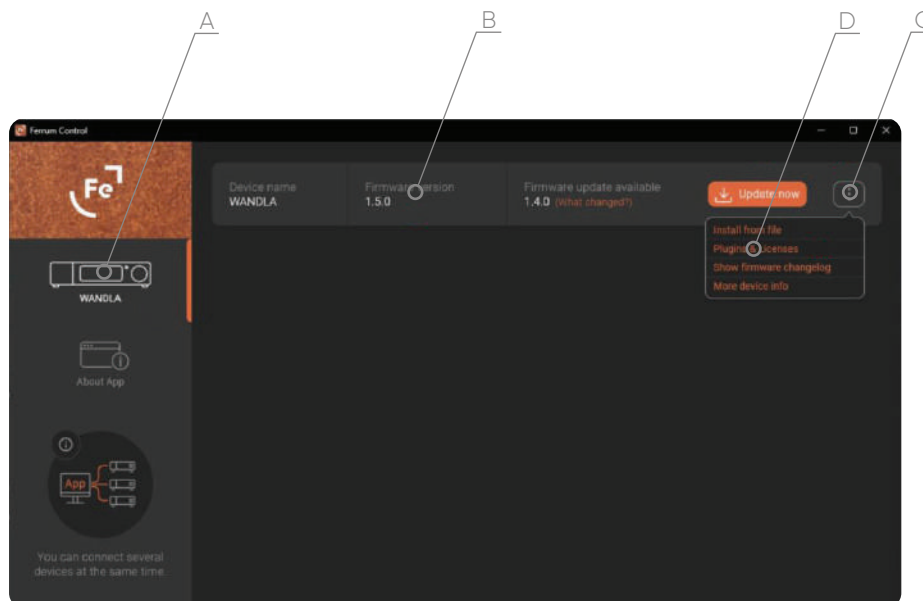


Figure 12

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

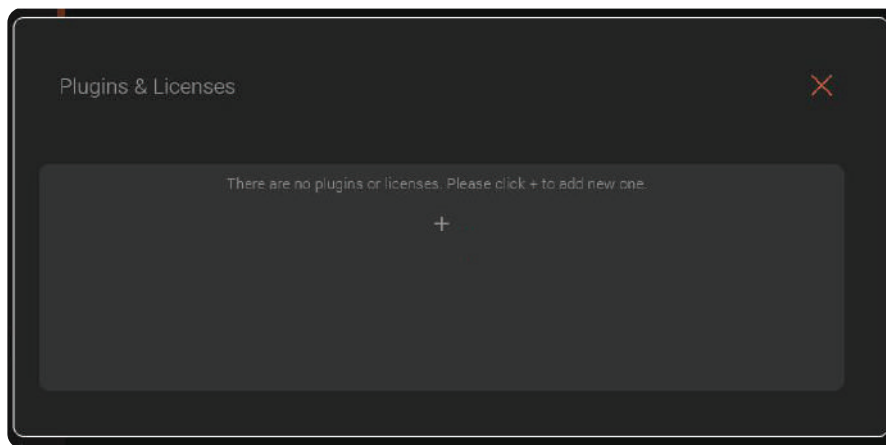


Figure 13

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

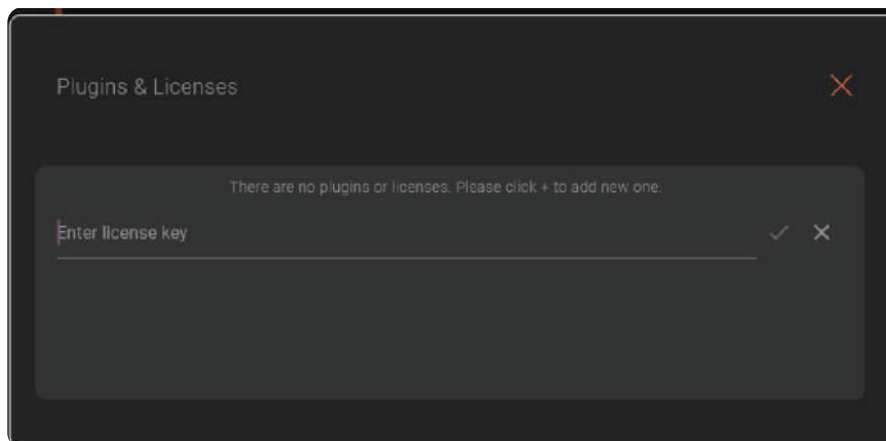


Figure 14

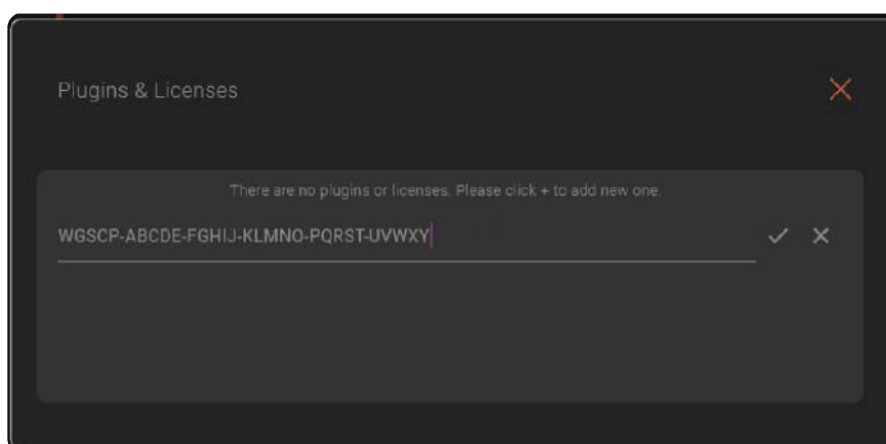


Figure 15

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

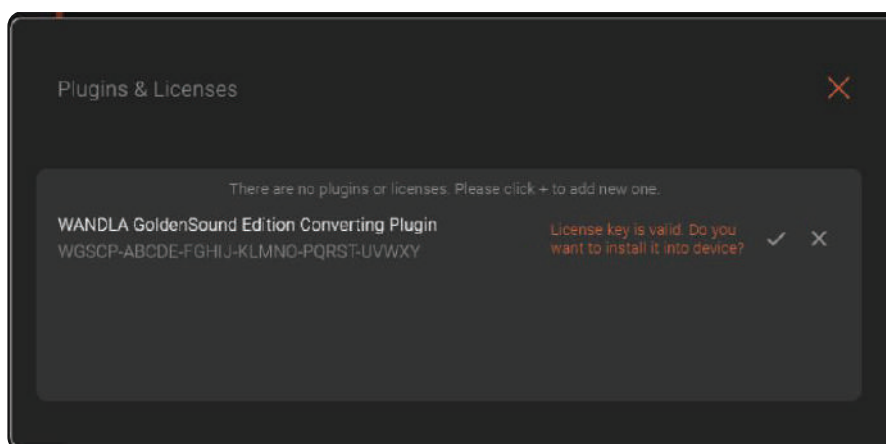


Figure 16

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

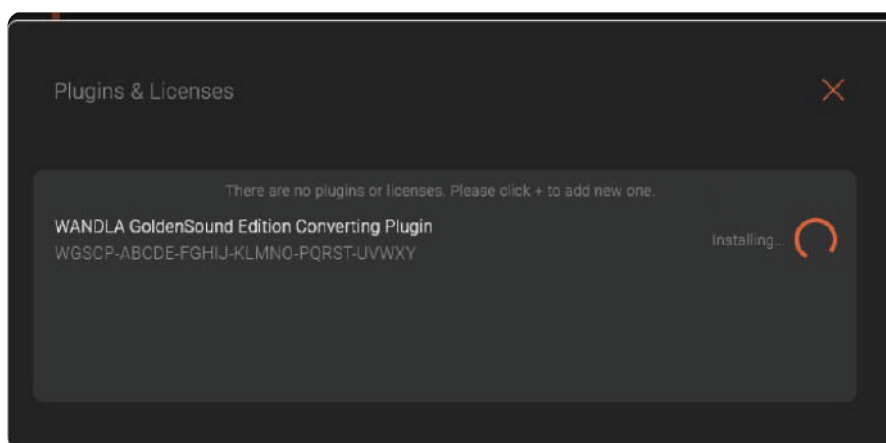


Figure 17

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

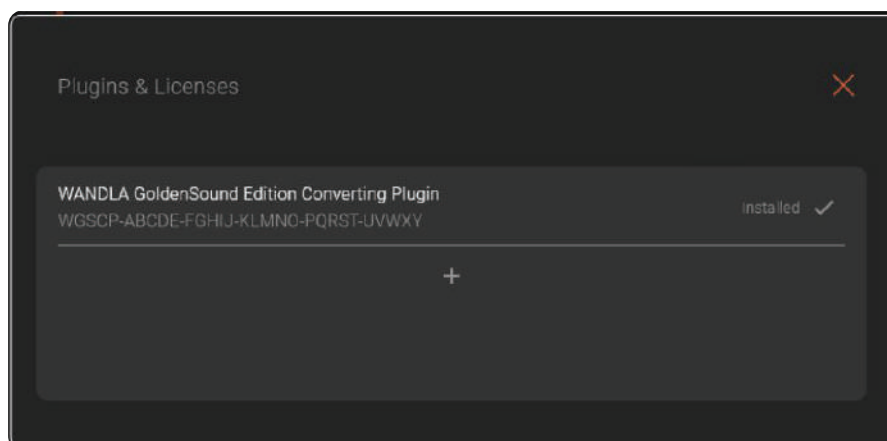


Figure 18

14.2.2 DEINSTALLATION

1. Repeat steps 1–4 from the installation procedure.
2. Click the 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 on user's optical cable and transmitter)
 - Coaxial S/PDIF (up to PCM 192 kHz/24-bit, DoP 64)
 - USB (up to PCM 768 kHz/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: 47 k Ω
- Line outputs: balanced XLR; unbalanced RCA
- Volume control: analog with bypass option / digital for DAC operation only
- Output level V_{OUT} @ 0 dBFS, 1 kHz sine:
 - RCA:
 - RED: $2 V_{RMS}$ (WANDLA & WANDLA HP); $1.75 V_{RMS}$ in WANDLA GoldenSound Edition
 - PRO: $5 V_{RMS}$ (WANDLA & WANDLA HP); $4 V_{RMS}$ in WANDLA GoldenSound Edition
 - XLR:
 - RED: $4 V_{RMS}$ (WANDLA & WANDLA HP); $3.5 V_{RMS}$ in WANDLA GoldenSound Edition
 - PRO: $10 V_{RMS}$ (WANDLA & WANDLA HP); $8 V_{RMS}$ in WANDLA GoldenSound Edition
- Frequency response analog inputs: 10 Hz – 200 kHz, ± 0.1 dB
- DAC THD: -121 dB (0.00009%); THD+N: -115 dB (unweighted)
- Analog input THD: -123 dB @ $2 V_{RMS}$ output level
- Dynamic range analog: 127 dB (A-weighted)
- Dynamic range digital:
 - 122 dB (A-weighted, WANDLA & WANDLA HP)
 - 119 dB (A-weighted, WANDLA GoldenSound Edition)
- Crosstalk: -120 dB for 1 kHz, better than -100 dB for 20 Hz – 20 kHz
- Output impedance unbalanced: 22 Ω
- Output impedance balanced: 44 Ω
- 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: 1 W into 50 Ω
- Output Power Balanced: 3.5 W into 50 Ω
- Dyn. Range: 122 dB
- HP Output impedance: 0.5 Ω unbalanced; 1 Ω 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 centre positive; proprietary FPL 4-pin DC connector (FPL); 22–30 V DC
- Power adapter: 100–240 V_{AC} to 24 V_{DC}
- Dimensions (W D H): 21.7 cm 20.6 cm 5 cm / 8.6" 8.1" 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 product 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 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, preferably 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:

<https://ferrum.audio/support/>

18. Warning

Warning: Excessive sound pressure from speakers and headphones can cause hearing loss. In order to use this product safely, avoid prolonged listening at excessive sound pressure levels.

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 to 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.