DAC8 PRO

The nicest 8-channel D/A converter

Owner's manual

Okto Research

Contents

Technical specifications

Digital connectivity

- USB
    - o 8 output and 8 input channels
    - o asynchronous, UAC 2.0 compliant
    - o playback data formats
        - PCM, up to 192kHz / 32-bit
        - native DSD, 64x / 128x
        - DSD over PCM (DoP), 64x
    - o recording data format
        - PCM, up to 192kHz / 32-bit
- AES/EBU
    - o 4 AES/EBU inputs (SPDIF compatible)
        - up to 192 kHz / 24-bit
        - resampling-free (i.e. requiring a single signal source)
        - unique USB/AES input mode ensures a bit-perfect data flow from AES/EBU to USB, allowing for a real-time signal processing or simultaneous recording & playback with no resampling applied
    - o 1 AES/EBU output
        - fixed to playback channels 1 and 2 (of USB or AES/EBU, depending on the selected input)

Analog connectivity

- Main outputs (back side)
    - o 8 x Neutrik gold-plated XLR connector
    - o Output level: 4.1 V RMS differential full-scale
    - o output impedance: 200 Ohms
- Headphone output (front side)
    - o 6.3 mm (1/4") TRS connector
    - o Output level: 4.1 V RMS full-scale
    - o 120 mA linear output current
    - o fixed to output channels 1 and 2
    - o output impedance <100 mOhm

Analog performance

- 0.000032 % / -130 dB THD (Total Harmonic Distortion) full-scale, 1kHz
- 0.00011 % / -119 dB THD+N (Total Harmonic Distortion + Noise) or 119 dB SINAD full-scale, 1kHz
- 125 dB dynamic range
- 0.000224 % / -113 dB THD+N @ 100 mW into 32 Ohms headphone output

Menu functions

- Individual volume for each of the 8 output channels (relative to the master volume)
- Routing matrix (any input channel to a specific output channel)
- Upper volume limit
- Remote control learning
- Choice between 7 PCM reconstruction FIR filters
- Configurable display timer to dim or turn off the displays
- Configurable auto on / auto off with non-zero audio data detection

Other features

- Trigger output
  - o 5 V voltage level
  - o short-circuit proof with 15 mA maximum current
  - o pulse or continuous
- Full control with either rotary or remote control
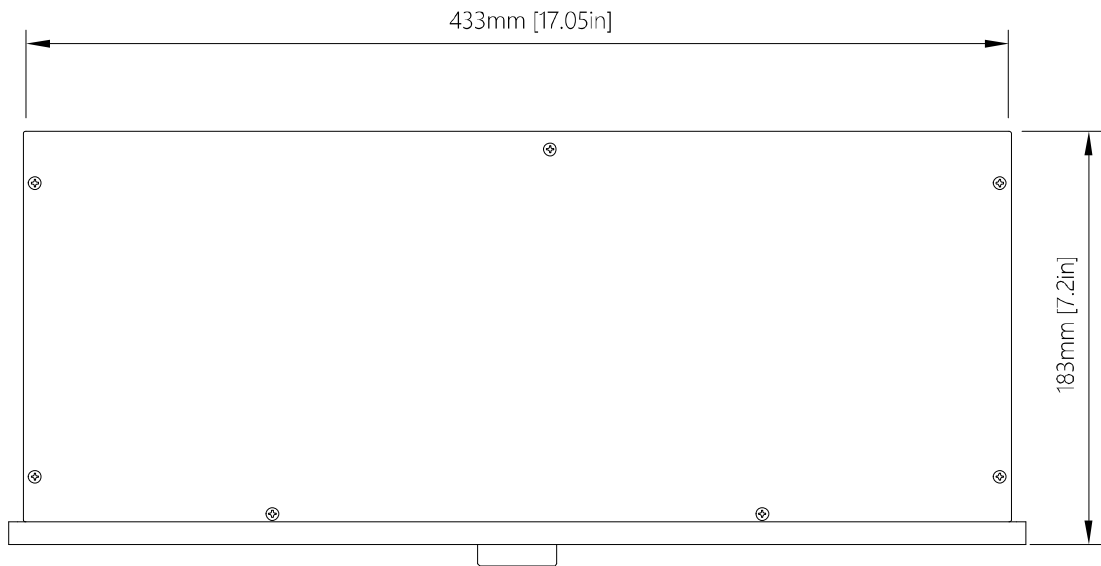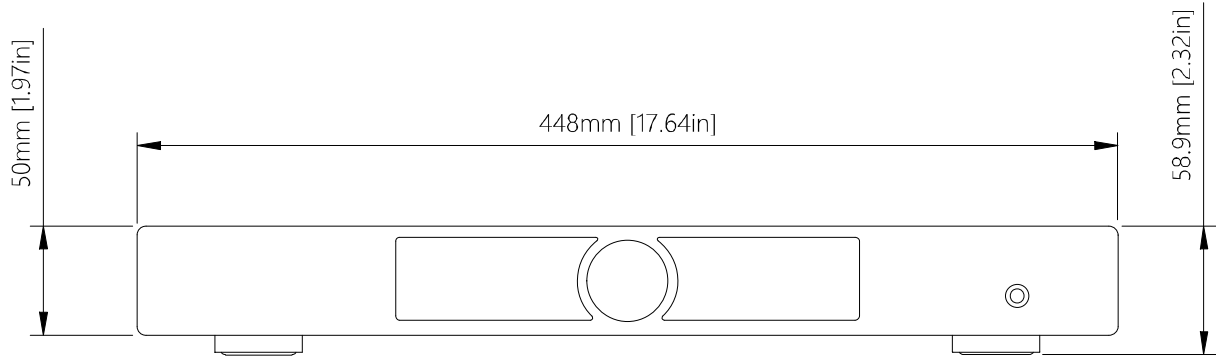- Rack-mountable with optional 2U, 19" rack mounting brackets

Dimensions

- 448 mm x 183 mm x 50 mm, excluding user-removable feet
- Weight: 4.5 kg (10 lbs)

Power

- Mains voltage: 120 V AC or 230 V AC (depending on the country of order)
- Power rating: 15 W

Mechanical drawings

448mm [17.64in]

50mm [1.97in]

58.9mm [2.32in]

433mm [17.05in]

183mm [7.2in]

Back panel overview
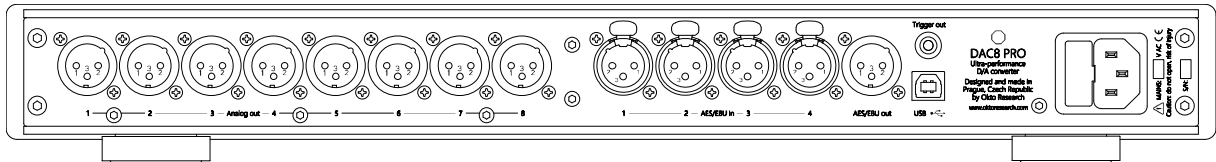
Package contents

- DAC8 PRO (silver or black depending on your choice, 120 V or 230 V version depending on the country of order)
- USB cable (black, 2 m)
- Apple Remote (optional)
- Rack mounting brackets (optional)

Digital connections

USB

Host drivers

On Mac OS and Linux, no driver is needed thanks to the USB Audio Class 2.0 standard used by the unit, and the DAC8 PRO will be recognized as an 8-channel playback device and an 8-channel recording device. The only action required by the user is to select the DAC8 PRO in your operating system's audio control panel.

This also applies to Windows 10 and newer, however, it is strongly recommended to use ASIO to bypass the Windows sound mixer and allow for an exclusive access to the device and a bit-perfect data transport. Please contact us if you are interested in using the DAC8 PRO with older Windows operating systems.

To enable ASIO playback, please download the latest version of ASIO4ALL driver from asio4all.org and follow the installation steps.
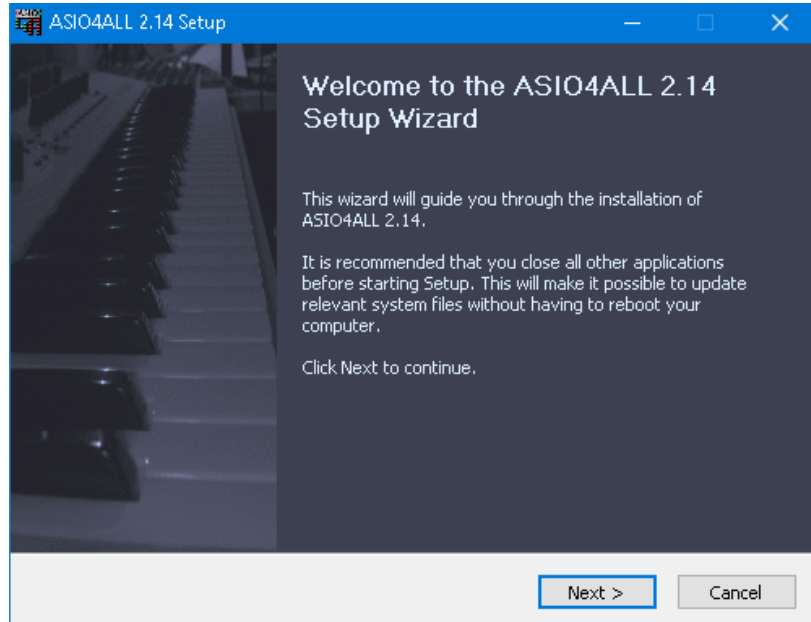
After the installation is complete, you will be able to see "ASIO4ALL v2" as an output device option in any ASIO capable playback software. The following picture displays the output device setting in JRiver:
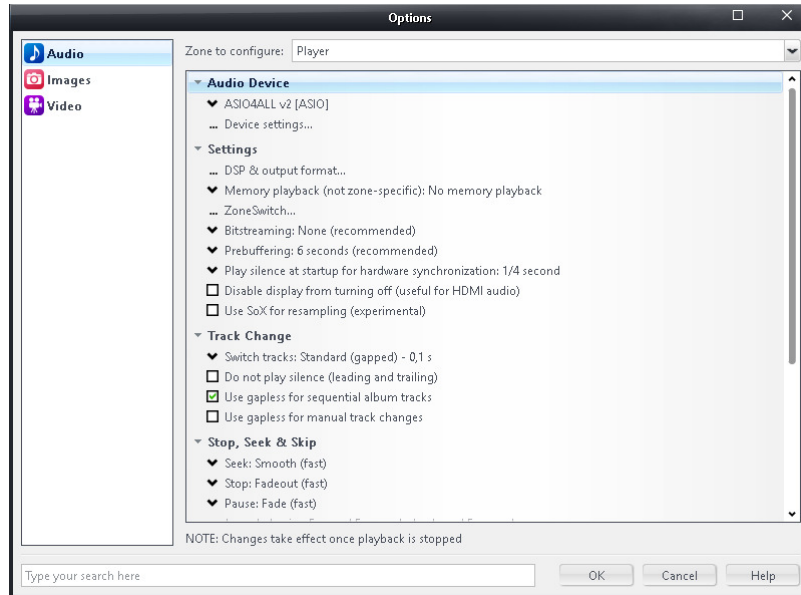
Our recommendation: not all Windows applications are capable of ASIO output (for example a Spotify desktop app or the Chrome browser). However, you are still able to achieve an ASIO playback with "ASIO Bridge / Hi – Fi Cable" by VB-Audio, that is available as a donationware on vb-audio.com/Cable/. After being installed, the ASIO Bridge will appear as a new audio output audio device and needs to be selected as default:
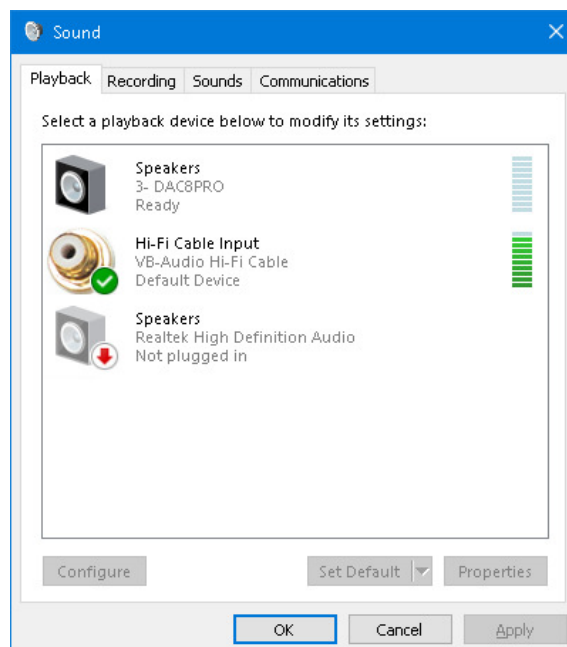
The actual ASIO output of the ASIO Bridge needs to be selected in the application's control panel (that can be accessed after clicking the icon on Windows taskbar) by clicking on "ASIO Device" text string:
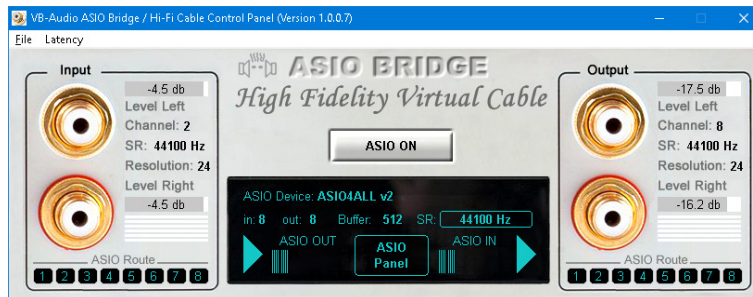
Please consider donating to the creators of both ASIO4ALL and ASIO Bridge if you like their work.

Warning: The USB input of the DAC8 PRO may not work correctly (or at all) when connected to a USB hub. It will also not work if connected to a USB 1.0 port. Be sure to use a native USB 2.0, USB 3.0 or USB 3.1 port of your computer.

AES/EBU

The DAC8 PRO offers 4 AES/EBU inputs that are free of resampling. That allows for a bit-perfect playback by the DAC8 PRO as well as recording at the USB host side, but it also requires the inputs to be mutually synchronized and carry signals with matching sampling rates.

Additionally, if only one input is used, it needs to be the input 1. If 2 of them are used, they need to be the inputs 1 and 2. There is no requirement for inputs 3 and 4.

The AES/EBU inputs will also accept a signal with the lower SPDIF voltage levels and while the requirement for termination impedance is different for the two standards, the SPDIF signal will generally be received correctly if the cables are not too long to cause significant reflections resulting in data corruption.

Analog Connections

Main outputs

The main analog outputs provide an extremely accurate analog representation of the digital signal received by the DAC8 PRO's selected input.

The full-scale voltage level is 4.1 V RMS and the output impedance is 200 Ohm differentially. The outputs are protected against long-term short circuit.

The volume control is always applied to the analog outputs. To bypass it, simply set it to 0 dB. Additionally, per-channel volume relative to the master volume can be applied if a non-zero value is selected in the Volume menu.

Warning: we discourage from using balanced-to-unbalanced cables and converters. Doing so will result in a vastly decreased analog performance and may be also cause of ground-loop induced hum issues. Unbalanced signal paths (e.g. widespread RCA) are unsuitable for device-to-device connections if high signal performance is desired, since they do not offer a separate path for equalizing ground loop currents that will naturally occur in a real-world environment.

Headphone output

The headphone analog output, available on the front panel via a 6.3 mm (1/4") TRS connector, provides 4.1 V RMS full-scale voltage level, up to 120 mA linear current and less than 100 mOhm output impedance. It is suited for majority of headphones and earphones, ranging from 16 Ohm IEMs to a large 600 Ohm headphones with open construction.

Input modes

Because the DAC8 PRO is an asynchronous device in regard to its USB input, it sets the pace of the rate in which samples are coming from the USB host when the USB playback is active. On the other hand, AES/EBU connections require a synchronous operation of the receiving device with the transmitting device as they have no receiver-to-transmitter feedback path and the clock signal is encoded in the data stream instead. The three input modes of the DAC8 PRO were designed to make the two standards work together and offer the most functionality.

Pure USB

Pure USB input mode does make use of the DAC8 PRO's low-phase noise oscillators as the master clock for XMOS processor facilitating the USB data transport and processing. In the Pure USB mode, AES/EBU output is operational and transmits channels 1 and 2 of the USB audio data.

USB / AES

USB / AES is a unique mode of operation that does use the master clock recovered from the 1st AES/EBU to set the pace of the audio data transfer from the USB host. This means that the data recovered by the AES/EBU inputs are transported in a bit-perfect manner to a USB host via the 8 USB input channels, allowing them to be recorded or processed and sent back to the USB output channels to be replayed by the DAC8 PRO.

Because the UAC2 audio device is unable to change the USB host current sampling frequency, the DAC8 PRO will display a warning message if the sampling frequency of the received AES/EBU signal does not match the one selected by the USB host. It is up to the user to make the sample rate of the AES/EBU transmitting device match the sample rate of the UAC2 driver of the USB host.

Pure AES

Pure AES mode does not need a USB connection for operation. It does use the recovered AES/EBU clock for processing the received audio data and DAC8 PRO's internal, low-phase noise oscillators for the D/A conversion. The DAC8 PRO's jitter eliminator is active to ensure the highest-performance possible.
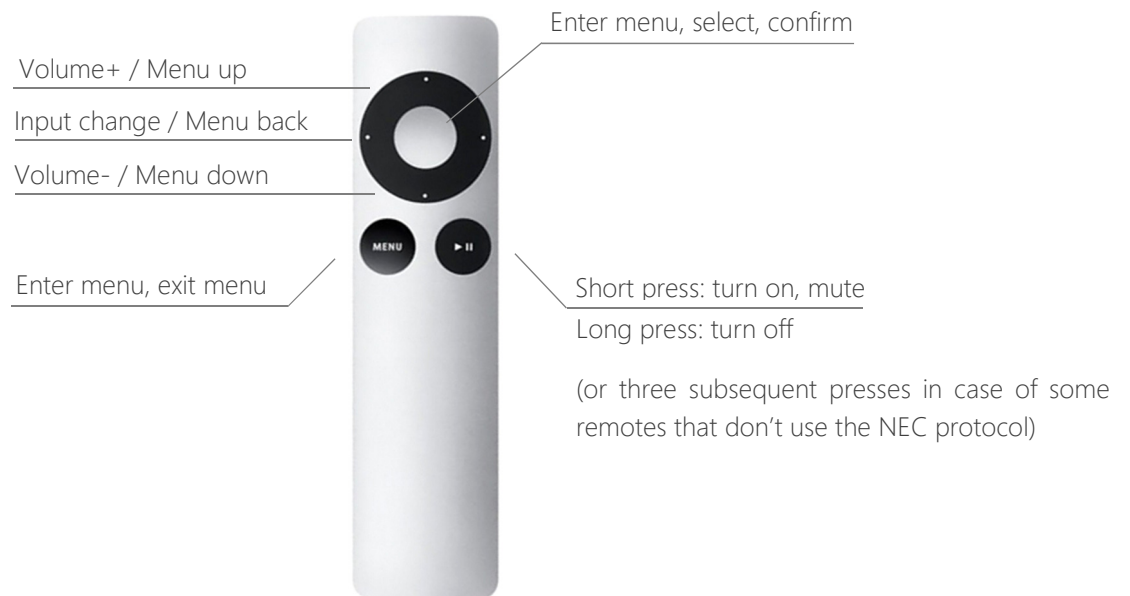
Controls

DAC8 PRO can be fully controlled with either a rotary control including a push-on switch or an IR remote in an intuitive way. Additionally, any IR remote can be used thanks to the learning function. If you ordered an Apple Remote together with your DAC8 PRO, it will come paired with the unit.

Rotary control functionality

		Device state			
		Off	Main screen	Menu	Menu, selected
	Left/right turn	-	Volume control	Navigation	Modify
Input	Push	Turn on	Enter menu	Select	Confirm
	Long push	Turn on	Turn off	Back	Confirm

Remote control functionality

Volume+ / Menu up

Input change / Menu back

Volume- / Menu down

Enter menu, select, confirm

Enter menu, exit menu

Short press: turn on, mute
Long press: turn off

(or three subsequent presses in case of some remotes that don't use the NEC protocol)

User interface and menu system

Main screen – left display

▶ Pure USB
96kHz   24bit   PCM
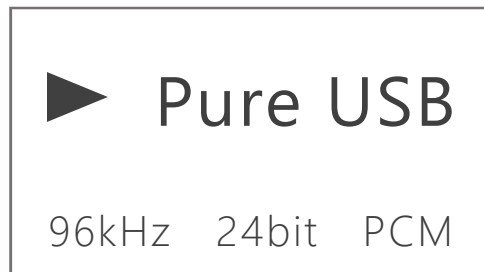
- Play / pause icon: indicates incoming data
- Input mode indicator: shows selected input mode
- Audio data information: shows sampling frequency, bit depth and data format (if applicable to the selected input mode and incoming data type)
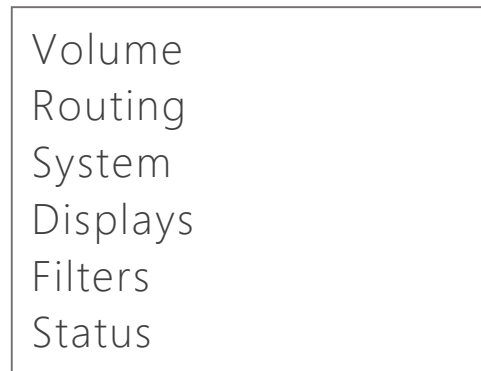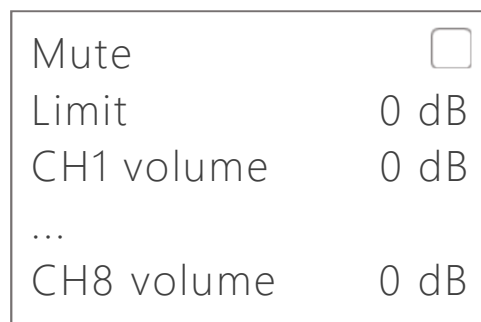
Main screen – right display

-32 dB max

- Volume: current master volume in dB relative to the nominal full-scale output
- Mute icon: appears if mute is enabled using remote control or in the menu system
- Min / max indicator: only appears if the volume reaches upper limit (set in the Menu > Volume > Lim) or minimum value (-99 dB)

Main menu

The main menu appears on the left display when the knob is pressed or a Menu or Enter button is pressed on the remote control.

```
Volume
Routing
System
Displays
Filters
Status
```

Volume submenu

```
Mute                ☐
Limit           0 dB
CH1 volume      0 dB
...
CH8 volume      0 dB
```

- Mute: mutes all the analog outputs (default: off)
- Limit: sets the maximum allowed volume
  - o   0 to -50 dB (default: 0 dB)
- CH1 to CH8 volume: an additional, per-channel volume relative to the master volume displayed on the main screen

Routing submenu

```
Out1 source:      CH1
Out2 source:      CH2
...
Out8 source:      CH8
```

- Out1-8 source: selects the source channel for the respective analog output

System submenu

```
Input          Pure USB
Auto ON            ☐
Auto OFF         2hrs
Trigger          cont.
Learn remote
Load defaults
```

- Input: selects signal input. Please refer to the "Input modes" for details
    - o Pure USB (default)
    - o USB/AES
    - o Pure AES
- Trigger: sets trigger output as continuous or 10 ms pulse on turn on and off
    - o cont. (default)
    - o pulse
- Auto ON: turn on the unit on incoming signal
- Auto OFF: turn off the unit after certain period with no signal present
    - o never
    - o 10 min
    - o 30 min
    - o 2 hrs (default)
- Learn remote: learn commands from any IR remote
- Load defaults: load factory defaults

Displays submenu

```
Brightness               6
Timer                  off
After timer            dim
Menu return            60s
```

- Brightness: sets display brightness in 6 steps (default: 6)
- Timer: sets a timer to dim or turn off the displays
  - off (default)
  - 10 s
  - 60 s
  - 5 min
- After timer: sets display action after the selected timer value expires
  - off
  - dim (default)
- Menu return: sets the time for an automatic return from the menu to the main screen
  - off (default)
  - 10 s
  - 60 s
  - 5 min

Filters submenu

```
PCM filter          FRMP
DSD filter          auto
```

- FIR filter
  - FRLP (fast roll-off, linear phase)
  - SRLP (slow roll-off, linear phase
  - FRMP (fast roll-off, minimum phase) (default)
  - SRMP (slow roll-off, minimum phase)
  - AFRLP (apodizing, fast roll-off, linear phase)
  - HFRMP (hybrid, fast roll-off, minimum phase)

- o BW (brickwall filter)
- DSD filter – sets the cut-off frequency of the low-pass filter for DSD playback
  - o auto (default)
  - o 50 kHz
  - o 60 kHz
  - o 70 kHz

Status submenu

```
Serial number        8
FW version           1
Temperature      35°C
Uptime        1:22:33
```

- Serial number – shows the serial number that is burned in the OTP (one-time-programmable) memory. The reading will not be affected by firmware updates.
- FW version – shows the current version of the device firmware
- Temperature – reading of the temperature at the DAC8 module
- Uptime – shows the elapsed time since the unit was powered on

Warranty

The DAC8 PRO is designed for a maximum reliability and each unit is tested extensively before it is shipped. However, if a spontaneous malfunction occurs, the product is covered with a 2-year warranty. Please be aware that any damage caused by abusive operation is not covered.

To ensure your satisfaction, we also offer a 30-day return policy. In case of a return, the customer pays the cost of the shipping back to us and the refunded amount does not include the cost of the previous shipping from us to the customer. The returned product and accessories must be complete, clean and free of scratches and other damage.

When receiving the product, customer is required to carefully check the package for damage and if some is present, require the delivery person to document the damage and write a report. This report, together with photographs, then needs to be e-mailed to us as soon as possible. If these steps are not taken, the transportation damage will not be covered by the warranty.

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Okto Research
U Druhe baterie 785/15
16200 Prague
Czech Republic

info@oktoresearch.com
www.oktoresearch.com

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Manual revisions

Rev. 1.1	Improved drawings
Rev. 1.0	Initial release

ASIO is a trademark of Steinberg Media Technologies GmbH.