

When Brinkmann Audio started exploring digital audio again after more than 25 years, we wanted to address three key basic requirements:

- Quality
- Longevity
- Ease of use

Longevity

Product longevity is a particular challenge in digital audio because of the ever-changing formats, standards and interfaces. Fortunately, there is also a relatively simple and straightforward solution. Besides the capability to perform Software updates, we designed the digital section of the Nyquist as a field-upgradeable Module that may be user exchanged. When a new hardware standard launches or a new DAC chip or DSP technology offers a significant leap in performance, we will be able to offer these state-of-the art improvements to all of our customers. Our digital module includes the digital connections, the processors and DAC chips, including their bespoke power regulators.

Ease of use

With digital audio there are myriad possibilities which can influence the signal. Using different filters is just one of them. We have decided to keep it simple, so our customers can focus on the musical experience rather than fumbling with different properties of the product. That's why we chose to pre-select one filter per format. The much bigger question in digital audio is the playback transport. If you are not using a CD transport or a purpose-made music server, there are many possibilities, with few of them being user friendly. Besides the possibility to stream to the DAC (via the mConnect App, for example), we decided to support roon music player because it offers some of the excitement that we experience when browsing our vinyl or CD collection. Together with its user-friendly remote control, roon is starting to become a de-facto standard supported by many digital audio companies. The Nyquist is a roon-ready endpoint (certification expected in Feb 2017) and hence can stream directly from any roon core server on the network.

Quality

At Brinkmann Audio, "Quality" refers to both Sound Quality and Build Quality.

The Nyquist is being manufactured to the same high standards as our other products, namely, turntables and electronics. Meticulously hand-assembled in Germany from the finest parts available, every product runs through a series of rigorous quality assurance processes. Since some of the components, like the Telefunken tubes, are NOS (New Old Stock), they are tested individually and pair-matched to ensure that every Nyquist lives up to Brinkmann Audio's ultimate quality standards.

During the research and development period, our main reference for Nyquist's Sound Quality were Brinkmann turntables, as we feel our 'tables achieve a uniquely natural and organic analog sound. We designed Nyquist to share this "Brinkmann DNA"

Our approach to audio quality is at once simple and rigorous: we want our products to serve as tools for our customers, to deliver as much of the musical experience to them as possible. We call the Nyquist our "Analogue D/A Converter" because we employed a holistic approach in its development. We do not distinguish between the digital and analogue parts of the circuit, but look at the whole product as one analogue circuit with all the consequences. For example, we spend the same, if not more, effort on the power supply for the digital parts of the circuit as we do for the analogue parts. We scrutinize every single component and its influence upon the sound.

Our belief is that human hearing combines the listeners' memories with the actual sound. If, for example, one hears a violin through an old tube radio, it still might transport a lot of emotion, because our memories complement the sound we hear. Any kind of distortion interferes with that experience. Assuming a circuit design that fulfills all the basic technical requirements, those distortions often come from resonances in the various components (especially capacitors) and via the signal processing in the DSP. Helmut Brinkmann's vast experience with resonance tuning is as important for the Nyquist DAC as it is for our State-of-the-Art Turntables. In the Nyquist, the careful selection of materials for the chassis and the Black Granite base offer superb resonance control and are chosen for their positive influence upon the sound. The chassis is also optimized for heat dissipation, which greatly extends the life of our Class A circuitry and tubes as well as maintaining ideal operating temperature.

The analog signal that comes out of the digital module passes through a pair of Lundahl transformers to filter high frequency distortion; in order to prevent sonic coloration, this is the only filter used in the analog circuit.

The Nyquist also features a headphone output. The analog signal for the headphone follows the same signal path, with all the benefits described above, including the tube output stage. The gain control is being switched to maximum, 10dB, and feeds the signal through a chip for the headphone volume control and from there into the headphone driver.

On the signal processing and D/A conversion side, we have put emphasis on the following three items:

- Optimal signal path for every format (DSD vs. PCM vs. MQA)
- Timing accuracy
- Ultra-low phase noise clocks for low jitter

Since PCM and DSD are two very different formats, we have decided to engineer individually optimized signal paths for every format. In Nyquist, DSD is not converted to PCM, rather, after a very precise re-clocking, it is sent directly to a discrete (i.e., non-IC) DSD DAC followed by a soft analog filter in order to reduce the high frequency noise inherent in a DSD signal. This analog filter has been carefully optimized: it is steep enough to reduce the noise energy to a level that will not impact the audio components which are "Downstream" in the playback chain, but not too steep, as we take great pains to preserve the air and openness of sound for which DSD is famous. Brinkmann employs relays to switch between the PCM and DSD signal path because relays work without loss. We have been testing several DSD DAC-Chips, but once you have heard the ease of the sound of a discrete DSD DAC, no chipset can compare!

The PCM and MQA signal paths differ only in signal processing that is being applied, as MQA is essentially PCM, with special reconstruction algorithms being applied. All PCM and MQA signals are up-sampled to 8x (i.e. 352.8kHz or 384kHz). This is being done in a powerful Processor with 16 processor cores, which also handles the MQA decoding. The up-sampled signal is then being re-clocked and sent to two ES9018S Sabre DACs: one for each channel. The ES9018S consists of 8 DACs each, which are combined for each channel to achieve the best possible result. The ES9018S is a very powerful chip, which has been designed to build systems with a minimum need for additional components. So it includes a digital PLL, various up-sampling filters and many more features. We are using the ES9018S purely as a DA converter and hence have switched off all the additional features. The filtering, i.e. up-sampling, is being done in a separate processor, which is much more powerful. The jitter is being taken care of by our re-clocking circuit. We took special care in designing power supplies for each of the various circuit parts inside the ES9018S. Even the clock-frequency of the ES9018S, which is variable, has been optimized for the best sound.

The clocks are ultra-low phase noise units, specifically designed for High Definition audio and placed in extremely close proximity to the DAC Chips in order to reduce jitter to a minimum.

The signal processing, i.e. up-sampling and rendering, is accomplished with special emphasis on timing accuracy. The up-sampling filters that are used for PCM cancel pre-ringing and are optimized for a short impulse response. Both are important parameters to avoid typical digital effects and listening fatigue. MQA finally provides the possibility to reduce time smear, i.e. distortion of the timing of the signal, to a minimum. The MQA algorithm parameters have been optimized for the Nyquist with hours of test material in order to achieve the best results.

The closer we come to the source component in an audio system, the more important is attention to every detail. Why else would the quality of the USB cable matter? The circuit design in the digital module has been optimized for short signal paths, low resonance and optimal power regulation from the signal processor to the DA Converters. The digital module alone has 11 dedicated power supplies. This module also includes a streamer with Ethernet input. The streamer functionality comes with several advantages compared to the USB input. Since we have the full streamer circuit under control, we were able to optimize it sonically even more than the USB input, which always has to cope with the imponderables of the cabling and the server or computer connected to it. So with the streamer, Brinkmann has been able to remove one more unknown variable from the equation.

The Nyquist has a special high voltage power supply for all analog circuits including the DAC output.

After all these myriad considerations it is the fine tuning and balancing of the overall product that leads to the intended sonic result. One cannot simply look at parts of the circuit or the chassis separately. After each detail has been individually scrutinized and optimized, the sonic signature of the whole must achieve a lofty level of realism and listening pleasure. As Brinkmann Audio, it is through relentless fine tuning of the product that this performance is achieved. This fine tuning demands years of experience in creating audio products and is, in the final analysis, what sets Brinkmann Audio products above the rest.