

September 2014

## DESIGN BRIEF

PRE60 reference preamplifier, 8 pages



### Introduction

The PRE60 is a reference audiophile preamplifier designed to complement all high-end power amplifiers but chiefly as a companion to its matching A60 UFPD power amp. With these new components Primare reclaims its presence in the high-end music system market, reprising the iconic designs of previous decades with ravishing new separates, complete with state-of-the-art audio streaming performance and striking two-tone bodywork. By combining our traditional build quality and analogue circuit design with the finest digital processing, the first 60 series music system represents a major step-up from the 30 series and introduces a new supremely audiophile level of performance to Primare's product range.

The PRE60 features the comprehensive OLED display and control parameters established by the EISA award-winning I32 integrated amplifier. It is housed in a heavy gauge alloy steel chassis (15mm front panel), and incorporates two pairs (L/R) of low-noise balanced XLR inputs, four pairs of RCA inputs, RS232, trigger and IR inputs. There are two pairs of RCA outputs and two pairs balanced XLR outputs, as well as a record output.

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## DAC/media board

The PRE60's integrated DAC/media board offers MEDIA/streaming connections such as USB, iPod, LAN etc. It provides up to 24 bit/192 kHz streaming of files from Internet, NAS or PCs, as well as Internet radio content and also a digital audio input from a range of devices including CD players, smart phones, personal players, sat boxes etc. Input/outputs include 3x optical, 1x SP/DIF, USB-A, USB-B, WLAN, LAN inputs (incorporating an asynchronous master clock for low jitter), and a Digital (192 kHz) output.

In addition there is a high quality easy-to-install aptX Bluetooth upgrade for the PRE60, which takes the form of a small internal circuit board and external antenna (for improved reception). The threaded antenna input uses a vacant (pre-prepared) portal on the back panel of the PRE60.

## What we define for File Based Audio:

**Streaming: 'live' download for Internet radio and Music services like Spotify and playing music over a network from NAS or PC**

**Playback of Audio files: Playing music files directly from laptop or PC over a USB-B connection. This means using programs like iTunes (Amara) and JRIVER as user interface**

## Recommendations

- Use of a high quality wireless router
- Use of high quality CAT7 Cables
- Use of a switch between the Primare MM30, NP30 or PRE60 and computer or NAS
- Use of good quality files such as WAV, AIFF or Flac-uncompressed
- Primare App is available for both iOS and Android. (iOS version supports Voice Over for visually impaired people)
- For High Res streaming LAN is needed.
- WLAN: 802.11b, g, n; 2.4 GHz band; WPA, WPA2 security – Ethernet: 10/100 MBit/s – DHCP and AutoIP support
- Advantage of an asynchronous USB connection is that the clock, present in the DAC, controls the flow of audio data from the computer to avoid the imprecise clock used in the computer.
- Please use a high quality USB-B cable for connection and make sure to check your audio settings in your computer
- Also try the different USB connections on your laptop as they do sound different.
- Please make sure to download the PC audio driver from the SUPPORT section on our website
- For playing music from PC over USB-B please download the Primare PCaudio driver from the SUPPORT page from [www.primare.net](http://www.primare.net) .
- From MAC it will play automatically.
- Over USB-B will give best sound quality from Spotify PREMIUM. (please set audio setting in Spotify on Extreme)
- Firmware updates can be done from the device's MENU or from Primare App.

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## Supported Audio Formats

Codec	Channels	Samplerates in kHz	Sample format	Bitrate	Gapless	Restrictions
WAV	mono/ stereo	8, 11.025, 16, 22.05, 32, 44.1, 48, 88.2, 96, 176.4, 192	Int: 8, 16, 24 Float: 32	n.a.	yes	samplerate > 48kHz not on WLAN
LPCM	mono/ stereo	8, 11.025, 16, 22.05, 32, 44.1, 48, 88.2, 96, 176.4, 192	Int: 8, 16, 24	n.a.	yes	samplerate > 48kHz not on WLAN
AIFF	mono/ stereo	8, 11.025, 16, 22.05, 32, 44.1, 48, 88.2, 96, 176.4, 192	Int: 8, 16, 24 Float: 32	n.a.	yes	samplerate > 48kHz not on WLAN
FLAC	mono/ stereo	8, 11.025, 16, 22.05, 32, 44.1, 48, 88.2, 96, 176.4, 192	16/24	n.a.	yes	samplerate > 48kHz not on WLAN
ALAC	mono/ stereo	44.1, 48, 88.2, 96	16/24	n.a.	yes	
MP3	mono/ stereo	8, 11.025, 16, 22.05, 32, 44.1, 48	n.a.	max 320kBit/s CBR/VBR	yes	gapless support needs LAME extensions in file header
MP4 (AAC)	mono/ stereo	8, 11.025, 16, 22.05, 32, 44.1, 48	n.a.	max 400kBit/s CBR/VBR	yes	gapless support needs LAME extensions in file header
OGG Vorbis	mono/ stereo	16, 22.05, 32, 44.1, 48	n.a.	max 500kBit/s CBR/VBR	no	
WMA	mono/ stereo	8, 11.025, 16, 22.05, 32, 44.1, 48	n.a.	max 320kBit/s CBR/VBR	no	WMA9 only, no lossless or professional codec

## 24/192 USB Interface

For reliable 24/192 operation, Primare has chosen XMOS because it offers an integrated communication hub hosting the MCU. XMOS and Primare's developers in Sweden, have collaborated to optimize XMOS firmware for better performance from Primare's XMOS application.

### DAC

The PRE60 uses a SRC4392 sample rate converter in conjunction with a Crystal CS 4398 24/192 Stereo DAC (as per DAC30 and BD32), running continually at 24/192. Incoming data at rates other than 24/192 are up-sampled to 24/192 to ensure the optimal operation of the DAC.

**Primare Control App available for iPhone/iPad and Android.**

The Primare App allows you to choose and play media (including Internet radio) at resolutions up to 24bit/192kHz from network shared music sources and storage through NP30, PRE60 and from I32 and PRE32 with installed MM30 board.

Primare App will:

Establish network connections and play from any network shared music source

Play from USB-A, (stick, iPhone etc)

Play files up to 24bit/192 kHz resolution

Play internet radio (vTuner – <http://www.vtuner.com> )

Display and save playlists

Display format, bit rate and sample rate of the song playing

Provide fast forward and back navigation of the song playing

Provide volume control including default at start-up

Allow source selection of devices connected to inputs of the I32, PRE32, PRE60 and NP30

Allow the renaming of inputs on I32, PRE32 and PRE60

Give the I32, PRE32, PRE60 or NP30 a name on the network

Manage software updates on I32, PRE32, PRE60 and NP30

Please download the guide here:

<http://www.primare.net/product.asp?ProductID=59&d=5&c=1>

**How to use Spotify with Primare:**

Please download the guide here:

[http://www.primare.net/assets/\\_managed/products/files/SpotifywithPrimare\\_1.pdf](http://www.primare.net/assets/_managed/products/files/SpotifywithPrimare_1.pdf)

**Using a standard UPnP App**

Any standard UPnP application on Android or Iphone/Ipad can be used to access the streaming functionality. However, while UPnP will allow you to browse a media server with playlists, tracks, album-art and transport controls, some features are not available (USB-drive, Ipod, Ipad, Iphone-USB devices). Also no radio is supported with a standard UPnP App.

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## **Firmware upgrade**

If a network connection is available, the PRE60 can connect to a Primare server to download new firmware. The Primare App offers an auto-upgrade feature, which automatically notifies the user when an upgrade is available. Simply activate the upgrade from the App. New Firmware can also be upgraded using a USB flash memory.

## **Audiophile Topology**

All signal paths are fully balanced and as short as possible. All signal treatments (source selection, volume and channel balance trims) are performed purely in the analogue domain. Unbalanced inputs are converted to balanced signals by a conversion stage buffered by the excellent sounding Burr Brown OPA2134 op-amps and fed to volume and balance controls employing closely matched NJW1195 attenuators in a balanced configuration. Source selection is via high performance signal relays.

Balanced signal transmission means that two identical signal lines are used to carry the same signal with opposite phase. Any noise is common to both lines is present in equal amounts and with identical phase. At the receiving end a (differential) receiver retains the opposite phase signals (music) and rejects the common phase ones (noise), leaving only the pure original signal. Balanced circuits therefore keep the signal as free as possible from interference.

The four (L/R balanced) single-ended 16dB gain stage modules are fully separated. Each has its own proprietary PCB. The gain module layout is fully integrated with the PRE60's main PCB and incorporates ultra-short signal paths and only the finest discrete components such as MOSFET transistors, MELF resistors and polypropylene capacitors. Active, well-balanced current sources are used instead of passive resistor networks.

The fully-balanced DAC section uses the flagship Crystal DSD DAC CS4398. It features an improved output buffer employing a discrete FET output device. To ensure the cleanest signal transfer, a gold pin connection from the media board to analogue pre amplifier stage is used.

The PRE60 is DC coupled from input to output. There are no capacitors in the signal path. Instead, active DC servos are used to compensate for any DC present, ensuring that the outputs are always free from DC artifacts.

All the front panel control components are kept well separated from the analogue part of the PRE60 by the front panel's intuitive design: the electronics are placed between the front panel and the main steel chassis.

## **Clean power with ultra-low-power standby**

The PRE60 uses a very high quality, ultra-quiet C-core transformer, custom-made for the role. Discrete analogue and digital power supplies are kept well separated. For the analogue side, a discrete ultra-fast voltage regulation circuit using discrete power transistors is deployed. The power supply capacitor bank is very large (43.000uF) and for lower ESR and best performance, is divided between many smaller capacitors. These measures have produced excellent THD+N and S/N ratio figures for the PRE60.

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The PRE60 incorporates a very low eco mode for standby. Power consumption is just 0.2W. In order to minimise high frequency components originating from the standby (high performance switch-mode) power supply when the PRE60 is in operation, the standby supply is switched off when the PRE60 is powered up, and a linear power supply comprising high quality discrete components and the C-core mains transformer takes over.

### **Easy User Interface**

An easy set-up menu is available via the PRE60's graphical display, which is dimmable in four steps. The display auto-dims after a few seconds and returns to programmed brightness at the touch of a control. Set-up includes power-up volume, input re-naming (up to 6 characters), input disabling and trim function (volume and balance) in steps of 1dB, as well as a surround processor bypass feature.

PRE60 functionality and streaming options can be fully controlled using the Primare App for iOS and Android, including input selection, volume control, file browsing and selection from online and stored music libraries.

### **Bluetooth Upgrade**

The high quality aptX Bluetooth upgrade takes the form of a small internal circuit board and external antenna (for improved reception), which installs easily, the threaded antenna input using a vacant (pre-prepared) portal on the back panel of the PRE60 and NP30.

For compatibility with Primare's high-performance audio design, the receiver-only module supports high quality Bluetooth via aptX (android), AAC, MP3 but rather than use an integrated DAC (as employed by other BT upgrades) the output is fed to the product's own Sample Rate Converter and up-sampled to 192kHz for optimum performance through the existing high resolution DACs. In this way Primare's Bluetooth Upgrade is among the most audiophile available, adding excellent Bluetooth sound quality to the convenience of wireless Bluetooth connections.

Following an easy software update via the PrimareApp, the BT input is added to the product control menu in a discrete BT section, which allows for the renaming of the input for the product display and the also the BT connection. Other controls are 'Visible', 'Unpair' and 'Autoconnect'.

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## Made in Sweden

### Product features PRE60

- Custom made C-core transformer for very quiet power supply
- Power supply capacitor bank is very large (43000uF)
- Separate power supply for the analogue pre-amplifier stage and the media board
- Four-layer board for very short signal paths and optimum grounding
- Excellent 1% MELF resistors
- Unbalanced input signal will be transformed to balanced
- Discrete regulated power supply for the analogue stage
- Selectable 6dB internal gain for high gain inputs
- 2 pair XLR output (Neutrik)
- 2 pair RCA output (Nextgen)
- Switch mode power supply for ECO standby
- Heavy duty chasses with 15mm front panel

### Media board

- Fully balanced DAC section using the Crystal DSD DAC
- Improved Output buffer with FET output device (discrete)
- Gold pin connection from media board to analogue pre-amplifier stage
- Primare App interface for controlling PRE60 functionality, browsing and media selection
- High quality aptX Bluetooth upgrade available



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**Product specification PRE60**

Analogue Inputs	2 pair XLR (L & R) 4 pair RCA (L & R)
Other In/outputs	RS232, IR in/out, Trigger in/out, RF.
Input Impedance	15k Both RCA and XLR
Analogue Record Output	1 pair RCA (L & R)
Pre Output	2 pair RCA (L & R), 2 pair XLR (L & R)
Output Impedance	110 ohms

**DAC/media board**

Audio formats:	WAV, LPCM, AIFF, FLAC, ALAC, MP3, MP4 ( AAC), WMA, OGG,
Sample rates:	32-192kHz
WLAN:	b, g, n mode; WEP (64 and 128Bit), WPA & WPA2 (TKIP & AES)
Connections input	3x optical (96kHz) 1x SPDIF (192kHz) USB-A USB-B (192kHz) WLAN (48kHz) LAN (192kHz)
Connections output	Digital (192 kHz)

**General**

Frequency Response	20Hz – 100kHz -3dB
THD + N	< 0.003%, 20Hz – 100kHz, 0dB gain.
Signal to Noise	-115 dBV
Max in /out level	10Vrms
Gain	16dB
Power Consumption	Standby: 0.5W; Operate: max 38W
Dimensions (WxDxH)	430 x 385 x 142mm

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