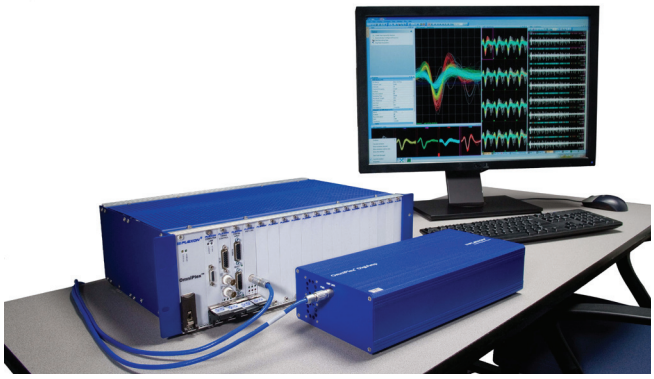
PLEXON®
Neurotechnology Research Systems

OmniPlex® Neural Data Acquisition System with the DigiAmp™ Digitizing Amplifier

The OmniPlex® Neural Data Acquisition System featuring DigiAmp™ technology (OmniPlex System) is Plexon's flagship electrophysiology research system. The 16 to 256 channel OmniPlex® System is a compact, flexible platform for high performance data acquisition and powerful online spike sorting. The OmniPlex expansion boards are housed in a rack-mountable expansion chassis linked to a host computer.



The DigiAmp is electrically isolated from ground and chassis power, with 16-bit A/D conversion at 40kHz per channel for acquisition of the complete wide-band signal. A single 0.2 inch digital cable (up to 35 feet long) transmits data and power between the DigiAmp and the OmniPlex expansion chassis.

The analog low-cut filter in the DigiAmp has selectable cutoff frequencies, which allows the user to try different values depending on the movement levels of the animal. Flexible digital filtering supports a wide variety of filter types (Bessel, Butterworth, Elliptic, 2-12 poles, plus notch filter) and cutoff frequencies, for extracting spikes and field potentials from the wide-band signal and for noise removal.

Digital events are processed on a 32 channel digital input module in the chassis, separate from the DigiAmp. The DigiAmp and all modules in the chassis are synchronized via a high-resolution master timing module.

Features

- 16, 32, 48, 64, 128, 192 or 256 channel configurations
- 16 bit A/D and continuous wide-band recording on all channels
- Electrical isolation
- 40kHz simultaneous sampling on all channels
- Software selectable digital filtering for isolation of field potential and spike frequency bands
- Superior common-mode rejection amplifiers
- 32 channels of digital input via dual 16 channel ports - individual TTL inputs and/or strobed word data
- 32 additional channels of 16 bit A/D conversion for auxiliary non-neural signals
- Online sorting in waveform space (time/voltage, using boxes, templates, lines, or bands) or directly in feature space (PCA, peak/valley, and others).
- Online tetrode and stereotrode sorting
- Low end-to-end latency for real-time experiments
- Compatible with Plexon MATLAB®/C++ online and offline SDKs, PlexNet, and NeuroExplorer® online link
- External start/pause/resume/stop of recording
- Records open-format PLX files, which can be read by NeuroExplorer and other applications, MATLAB, and C/C++
- Compact design: DigiAmp™ is only three inches tall
- DigiAmp available in two sizes: MiniDigi for 16, 32, 48 or 64 channels, and DigiAmp for 64, 128, 192 or 256 channels
- ***NEW*** Automatic peak alignment of detected spikes, automatic or manual creation of feature space sorting ellipses, and enhanced-PCA feature space.

Technical Specifications

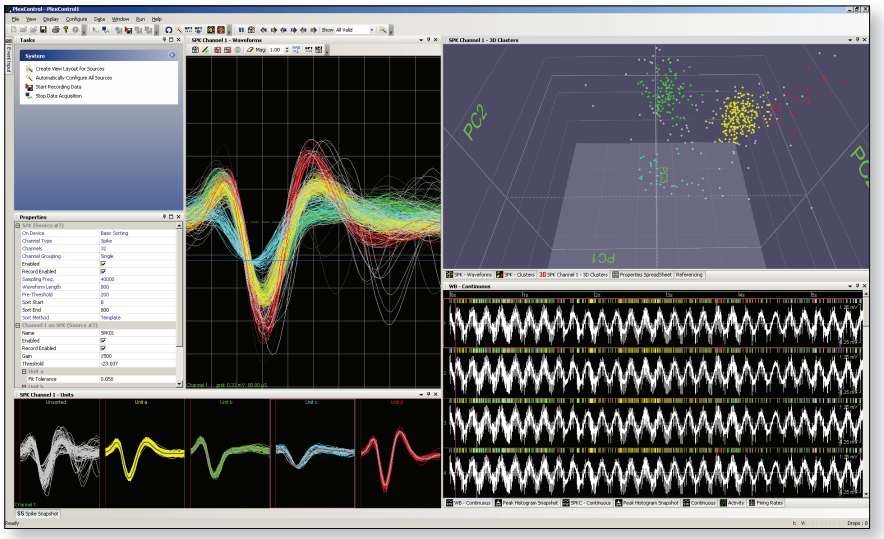
OmniPlex System Features	Specifications and options
Channels	16, 32, 48, 64, 128, 192, and 256 (plus 32 auxiliary non-neural A/D channels)
Digital input	32 channels total – dual 16 channel ports, individual TTL or strobed word
Common mode rejection	> 100dB at 0-60Hz
A/D input conversion	16-bit, 40kHz per neural channel, simultaneous sampling
Low-cut filter	0.05, 0.5, 3Hz – 1st order, selectable
High-cut filter	8kHz - 4th order Bessel
Amplifier gain	50x, 250x, 1000x, selectable (for use with 1x or 20x gain headstages)
Maximum headstage input voltage	10mV
Chassis dimensions	5.25 inches high, 19 inch rack
DigiAmp amplifier dimensions	82.55 x 152.40 x 330.20mm (3.25 x 6.0 x 13.0 inches)
MiniDigi amplifier dimensions	74.93 x 107.95 x 226.06mm (2.95 x 4.25 x 8.90 inches)
Amplifier input connection	Plexon standard 26 pin Harwin configuration for headstages

For more information email info@plexon.com or call +1-214-369-4957

PlexControl Software

The powerful online software for the OmniPlex System provides easy-to-use signal visualization and spike detection and sorting algorithms. Many online spike-sorting methods are available, including box, template, line, and band-sorting in time/voltage space, as well as contour-sorting in PCA feature space. Units can be defined based on either snapshots of the live data, or by "drawing" directly on the live data, in real time. Automatic setting of thresholds and automatic spike sorting (clustering) are supported, to facilitate rapid setup of large numbers of channels.

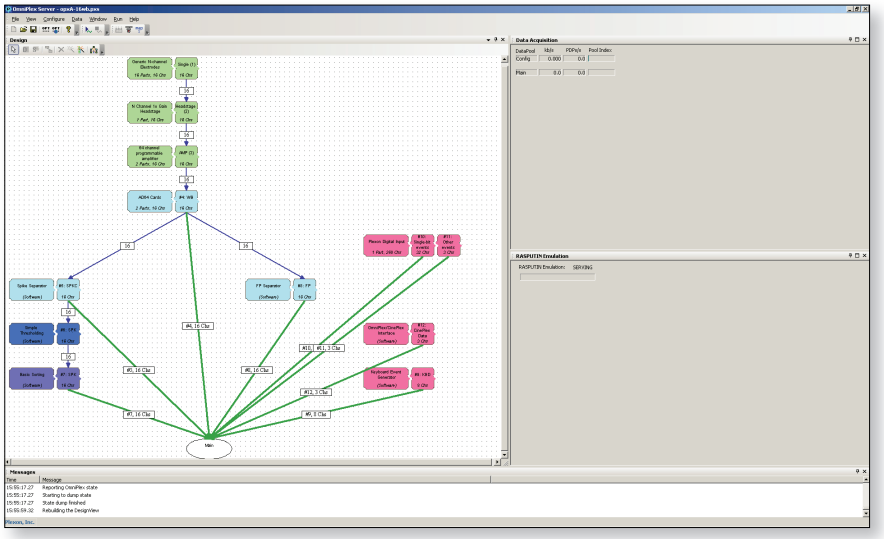
Continuous spike, field potential, and wide-band signals are displayed in PlexControl's flexible, customizable user interface, along with the detected spike waveform segments and their associated 2D and 3D feature space clusters for online spike-sorting. Each data type (continuous spike, field potential and wide-band signals, as well as thresholded spike waveform segments and digital event data) may be recorded to disk on a per-channel basis.



PlexControl

OmniPlex Server

The OmniPlex Server is the "engine" under PlexControl, acquiring data from the OmniPlex chassis and DigiAmp, sending commands to those devices, and implementing the software digital signal processing (DSP) for OmniPlex's filtering, spike detection, and spike sorting functions. Server is based on a modular, extensible architecture of hardware and software devices, interconnected in a dataflow topology. A Topology Wizard allows users to easily define custom configurations without tedious low-level editing. The OmniPlex Server also sends its data to online client programs, and is compatible with Plexon's existing online MATLAB and C/C++ APIs and Client Development Kits and the online NeuroExplorer link, enabling low-latency closed-loop experiments and online analysis of live data. Plexon's PlexNet protocol supports remote online data access across any TCP/IP or UDP network. The flexible digital filtering functionality in OmniPlex has also been incorporated into the Offline Sorter program, enabling the user to apply the same filters offline to continuously sampled data as is used online.



OmniPlex Server

A demo version of the OmniPlex software, which can be run without the OmniPlex hardware, is available on the Plexon website (www.plexon.com).