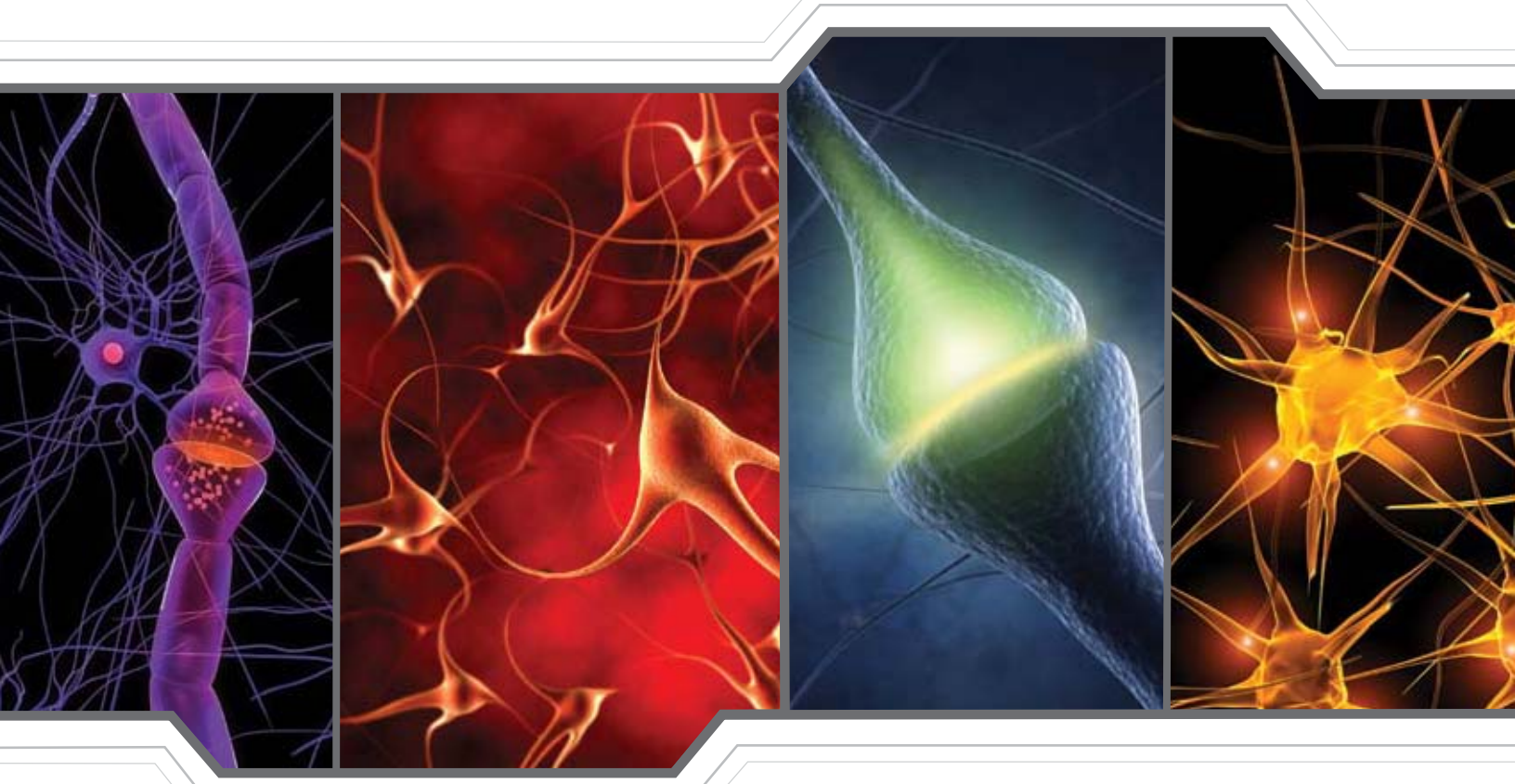
2013 PRODUCT CATALOG

PINNACLE
TECHNOLOGY INC



NEUROPHYSIOLOGICAL PRODUCTS

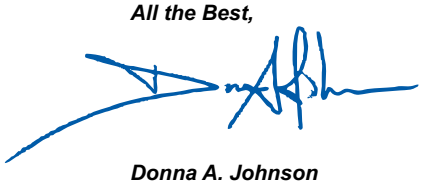
FOR LABORATORY RESEARCH

PINNACLE TECHNOLOGY, INC. | 2721 OREGON STREET | LAWRENCE, KS 66046
WWW.PINNACLET.COM | PHONE (785) 832-8866 | FAX (785) 749-9214 | SALES@PINNACLET.COM

Thank you for choosing Pinnacle Technology for your research needs. We offer a range of turn-key systems for neurophysiological studies using freely moving animals and are committed to developing new tools that simplify measurement, reduce cost, and enable new research. In addition, Pinnacle offers a host of supporting products ranging from cages to software analysis suites. We pride ourselves in providing exceptional customer service and are available to assist you with every stage of your research process.

By forging collaborative relationships with our clients, we are able to develop cutting-edge tools that improve and simplify your research. We look forward to working with you.

All the Best,



Donna A. Johnson
President and CEO

INFORMATION AND POLICIES

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Lawrence, KS 66046
USA

Ordering Information:

General: Products may be ordered directly from Pinnacle Technology, Inc., or from one of our approved distributors (see: http://www.pinnaclet.com/distributors.html). Some products may not be available in all countries.

Biosensors and Carbon Fiber Sensors: Pinnacle Technology, Inc., requires five business days notice prior to requested date of shipment for biosensor or carbon fiber sensor orders.

Payment Terms: Net 30 days from date of invoice for customers with established credit. Prepayment or COD may be required if credit has not been established. Major credit cards are accepted. Unpaid balances are subject to a late-payment fee of 1.5% per month. Pro-forma invoices are available for international orders.

Use of Products: All Pinnacle Technology, Inc., products are sold for laboratory research use only. Pinnacle Technology, Inc., products have not been approved by any government agency for use in human subjects or human testing.

Shipping Information:

United States: All orders ship F.O.B. Lawrence, KS. Standard orders are shipped FedEx® Ground (biosensor orders are shipped FedEx® 2nd Day). Freight charges are added to the final invoice.

International: Purchaser is responsible for payment of all import duties, tariffs, taxes, insurance, and other related charges. Pinnacle Technology, Inc., ships via the purchaser's courier of choice (UPS®, FedEx®, DHL®) using the purchaser's courier account number. Orders WILL NOT BE SHIPPED without this information. Pinnacle Technology, Inc., accommodates orders shipped through domestic shipping brokers.

Product/Price Notices: Prices and specifications are subject to change without notice.

Product Return Policy: All product returns require a Return Merchandise Authorization (RMA) number. Contact a Pinnacle Technology, Inc., representative to obtain an RMA number and proper RMA documentation. Returns should be shipped to Pinnacle Technology, Inc., within 30 days of RMA number issuance. RMA documentation must be included in the return shipment, and the customer is responsible for all shipping and handling charges. Standard items that have not been used or damaged may be returned within 10 days of original delivery for a credit or refund. A 15% restocking charge will be deducted from the refund or credit at Pinnacle Technology, Inc.'s discretion. Pinnacle Technology, Inc., does not offer refunds or credits on special, custom, or made-to-order products with custom modifications. All products returned for repair or replacement must be sanitary, cleaned appropriately, and securely packaged.

Warranty Information: In general, products are warranted against defects in material and workmanship. Purchasers must comply with Pinnacle Technology, Inc.'s policy regarding returns. Refer to Pinnacle Technology, Inc.'s website (www.pinnaclet.com) for detailed warranty information.

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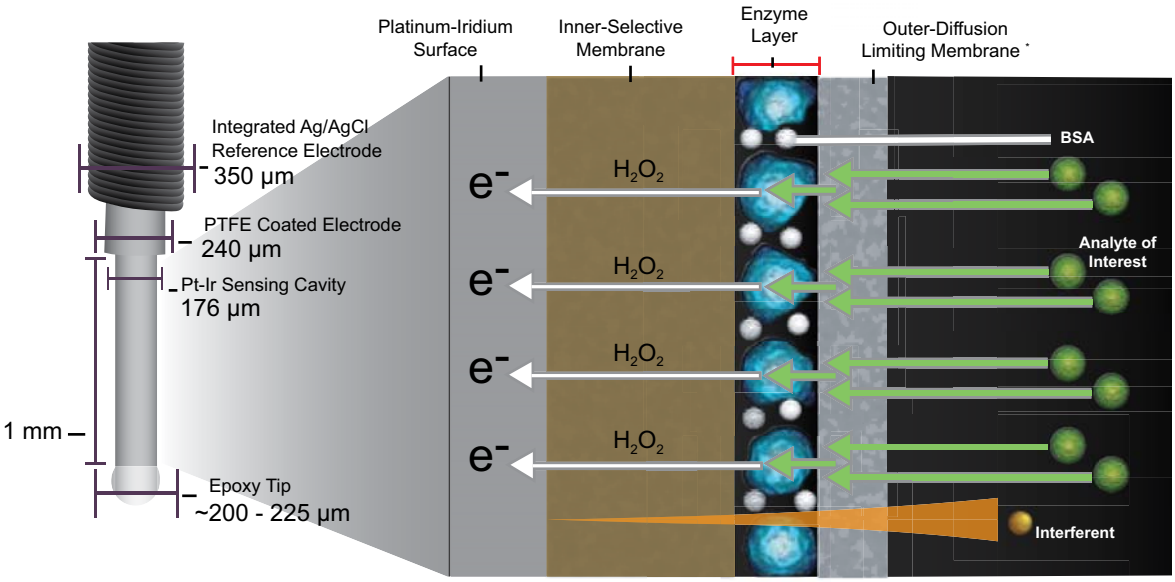
PINNACLE BIOSENSORS

BIOSENSORS monitor real-time changes in neurochemical concentrations. With Pinnacle's turn-key electronic and software systems, users can record and analyze second-by-second concentration changes of CNS neurochemicals in freely moving animals.

Pinnacle currently offers glutamate, glucose, lactate, choline, and ethanol biosensors. Our biosensors function by the enzyme-mediated processing of the analyte of interest. This results in the production of hydrogen peroxide that is then detected by oxidation at a Pt-Ir electrode. Electroactive interferents present in the brain are excluded via a passive selective membrane and through active removal when necessary.



* Outer-diffusion limiting membrane may not be present on all Pinnacle biosensors

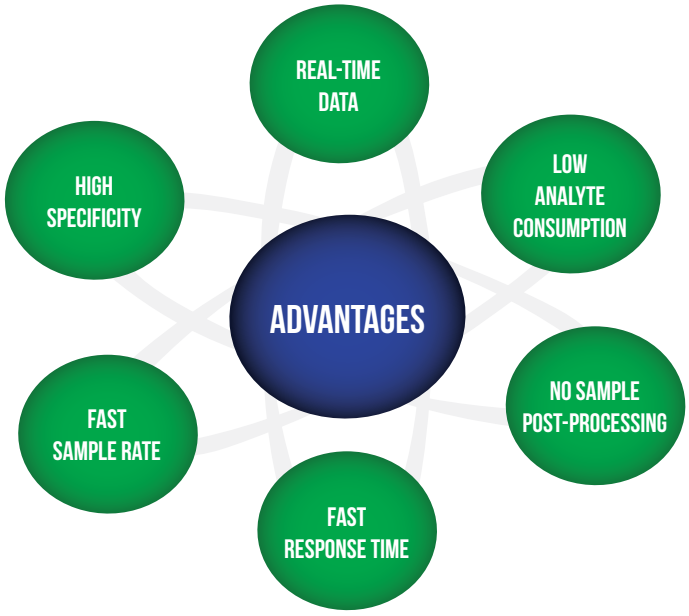
Our sensors are shipped within five business days of order receipt and include a warranty. Custom sensor sizes are also available. Contact Pinnacle for details.

BIOSENSOR CHARACTERISTICS

	In Vivo Lifetime	Limit of Detection
Glutamate	36 hours	0.05 - 0.1 µM
Glucose	96+ hours	2 - 5 µM
Lactate	96+ hours	5 - 10 µM
Ethanol	6 - 8 hours	0.1 - 0.5 µM
Choline	8+ hours	0.05 - 0.1 µM

COMMON USES

- *In vivo* monitoring of brain chemical microenvironments
- Neurochemical monitoring during behavioral and physiological activities
- Drug screening, including neuropharmacological effects
- Identification of biomarkers
- Investigating cognition, behavior, circadian cycles, stress, learning, memory, sleep, seizure, vigilance state, and new drug effects



CARBON FIBER SENSORS (CFS) are used in conjunction with Pinnacle's tethered and wireless potentiostats to measure the presence of total biogenic amines in the brain using fixed potential amperometry (FPA). They are also used with fast scan cyclic voltammetry (FSCV) systems. All Pinnacle CFSs require an Ag/AgCl reference electrode (7065). The sensors are 34 µm in diameter and 0.5 mm in length.

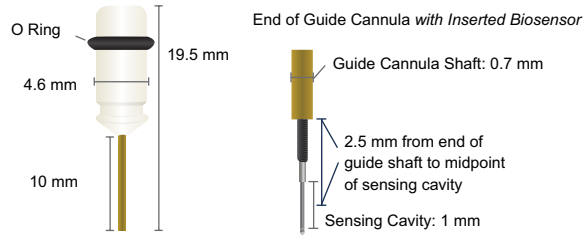
BIOSENSORS AND GUIDE CANNULAS

BIOSENSORS are purchased by cannula type and analyte of interest; carbon fiber sensors are purchased by cannula type. Pinnacle recommends the use of a guide cannula system for optimal results when implanting and recording from sensors in the brain of a freely moving animal. We manufacture standard biosensor electrodes (Pt-Ir wire with an integrated Ag/AgCl reference) that are compatible with two guide cannula types: BASi cannulas for rats and smaller BASi cannulas for mice. Sensors with no cannula are also available for purchase. All sensors sold by Pinnacle are for non-human use only.

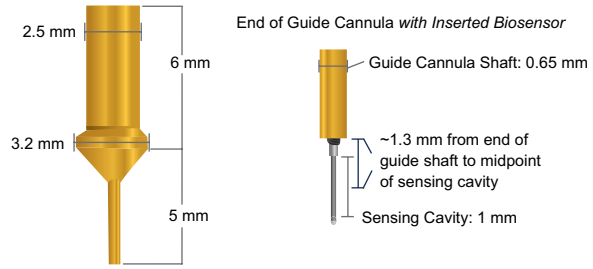
GUIDE CANNULA TYPES

Product	Item #
BASi guide cannula for rats	7030
BASi guide cannula for mice	7032

BASi RAT CANNULA



BASi MOUSE CANNULA



SENSOR TYPES

Product	Item #
No cannula headpiece 7001-Choline 7001-Glutamate 7001-CFS * 7001-Ethanol 7001-Lactate 7001-CFS-F ** 7001-Glucose	7001
BASi cannula headpiece for rats (wireless)	7002
BASi cannula headpiece for mice	7004
BASi cannula headpiece for rats (tethered)	7011

* 7001-CFS: Carbon Fiber Sensor

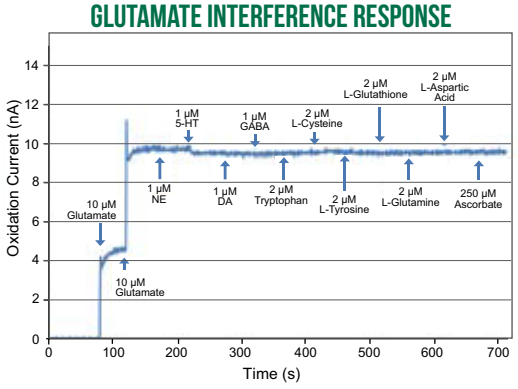
** 7001-CFS-F: Carbon Fiber Sensor (fixed in cannula)

All sensor types can be ordered in any of the analytes/configurations listed under 7001. For example, a glutamate biosensor with a BASi cannula headpiece for mice is ordered as 7004-Glutamate.

CUSTOM SENSORS ARE AVAILABLE

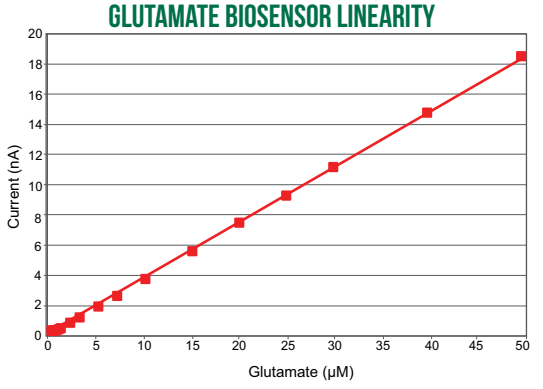
Contact a Pinnacle representative
at **(785) 832-8866**

GLUTAMATE INTERFERENCE RESPONSE



LINEAR
SELECTIVE
FAST

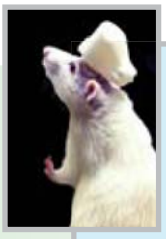
GLUTAMATE BIOSENSOR LINEARITY

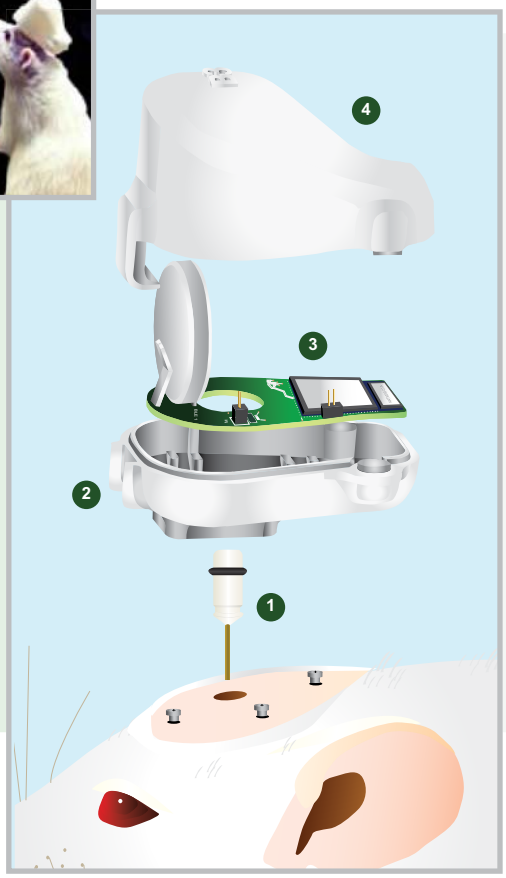


Pinnacle biosensors are selective for the analyte of interest and are linear at normal *in vivo* oxygenation levels over a physiologically relevant range, as shown in the diagrams above.

WIRELESS SYSTEM FOR RATS

The BLUETOOTH® POTENTIOSTAT SYSTEM uses Bluetooth® technology to wirelessly record up to two biosensors simultaneously in one animal. The battery-powered potentiostat, housed in Pinnacle's headmounted Rat Hat, communicates with a paired USB dongle up to seven meters away. Multiple potentiostats can be used in one room, allowing for high capacity biosensor studies.





1. Stereotaxically placed guide cannula(s) allow for biosensor insertion post-surgery.
2. The wireless system uses a Rat Hat to house the electronics, battery, guide cannula, and biosensor. The Rat Hat bottom is affixed to the skull with bone screws and dental acrylic.
3. A low-powered, wireless, two-channel potentiostat applies a bias and transmits up to two digitized signals to a paired Bluetooth® USB dongle that interfaces with Pinnacle's Sirenia® Acquisition software for data recording.
4. The Rat Hat top protects the system, allowing for group housed and behavioral experiments.

KEY FEATURES

- WEIGHT: 11.8 GRAMS
- TRANSMISSION RADIUS: 6 METERS
- SUPPORTS UP TO 2 SIMULTANEOUS BIOSENSOR RECORDINGS
- RECORD FROM MULTIPLE ANIMALS WITHIN SAME ROOM

HARDWARE KIT

8100-K5: Bluetooth® Potentiostat System
8172 - Bluetooth® potentiostat
9052 - USB extension cable
9054 - Bluetooth® dongle
Software and manuals are also included.

ACCESSORY KIT

8100-K7: Bluetooth® Potentiostat Accessories	
7030 - BASi cannula for rats (4)	**8134-20 -** Test load (2)
7035-R-BAS - Probe holder for BASi rat cannula	**8154-72 -** 8172 template
8107-BLE - Rat Hat top	**8241-S -** Screwdriver for 1/8" screws
8108-BLE - Rat Hat bottom (4)	**9005 -** 7-port powered USB hub
8111 - 1/8" screws (pkg. of 12)	**9031 -** Battery (pkg. of 5)
8112 - Drill bit (2)	
Contact Pinnacle for dual biosensor implantation accessories. Biosensors sold separately.	

TETHERED SYSTEMS ALSO AVAILABLE

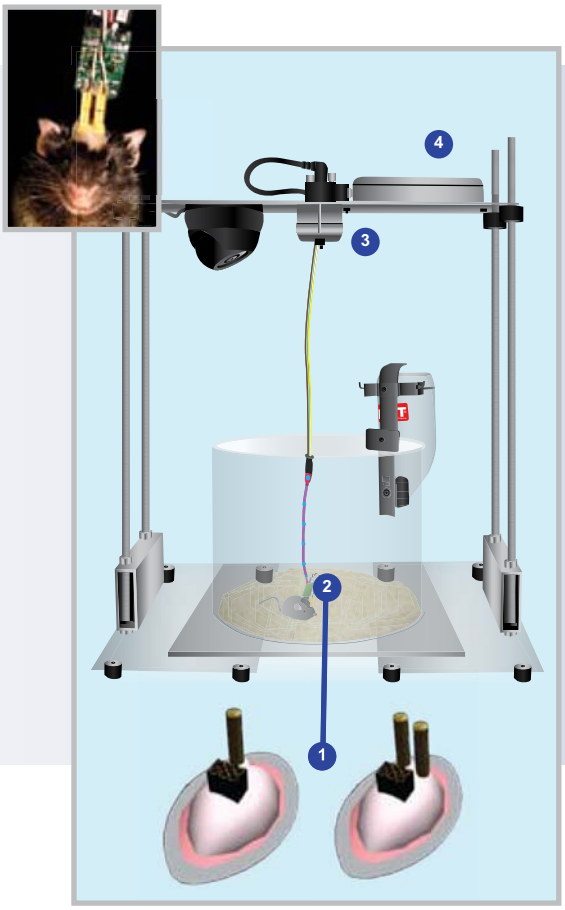
DISPOSABLE ITEMS

FOR RATS

Item #	Product
7030	BASi rat guide cannula
8108-BLE	Rat Hat bottom
8111	1/8" screws (pkg. of 12)
8112	Drill bit
9031	Battery for potentiostat (pkg. of 5)

TETHERED SYSTEM FOR MICE

The **MOUSE BIOSENSOR SYSTEM** features configurable input channels to record neurochemical concentrations. This tethered system employs a headmounted preamplifier for measuring up to two biosensors simultaneously in one animal, providing a turn-key solution for biosensor recordings in mice.



1. Stereotaxically placed guide cannulas allow for the insertion of biosensors post-surgery. Prefabricated headmounts are affixed to the skull with dental acrylic and act as a connection port for the two-channel biosensor preamplifier.
2. Headmounted preamplifiers house two connectors for biosensors and are key to quality, artifact-free data.
3. A low-torque commutator allows for unencumbered freedom of movement.
4. The data conditioning and acquisition system performs secondary amplification and filtering before sending data to Pinnacle's Sirenia® Acquisition software for collection.

KEY FEATURES

- LOW TORQUE
- WEIGHT: 2.2 GRAMS
- HEADMOUNTED AMPLIFICATION
- SUPPORTS UP TO 2 SIMULTANEOUS BIOSENSOR RECORDINGS

HARDWARE KIT

8400-K1-2BIO: Tethered Mouse Biosensor System
8401 - Data conditioning and acquisition system
8406-2BIO - Mouse preamplifier for up to two biosensors
8408 - Mouse commutator/swivel with 18" mounting plate
Cables for one animal, software, and manuals are also included.

ACCESSORY KITS

8400-K3-BIO: Tethered Accessory Kit for One Biosensor	
7032 - BASi mouse cannula (6)	**8209 -** 0.10" screws (3 pkgs. of 8)
7033 - Bio-only headmount (6)	**8241-F -** Screwdriver for mouse screws
7035-M-BAS - Probe holder for mouse cannula	**8254 -** 23-gauge needle (6)
8134 - Test load (2)	**9005 -** 7-port powered USB hub
8400-K3-2BIO: Tethered Accessory Kit for Two Biosensors	
Components of this kit are the same as above except for the quantities of 7032 (12) and 7035-M-BAS (2). Biosensors sold separately.	

FOR MICE

Item #	Product
7032	BASi mouse guide cannula
7033	Bio-only headmount
8209	0.10" screws (pkg. of 8)
8254	23-gauge needle

ADD SYNCHRONIZED VIDEO

See page 16 for details.

DESKTOP POTENTIOSTAT

PINNACLE'S FOUR-CHANNEL DESKTOP POTENTIOSTAT provides a cost-effective, easy-to-use, and highly accurate system for the development and use of high impedance, amperometric biosensors and biosensor arrays. It is well suited for anesthetized animal experiments, brain slices, and other *in vitro* studies. The system is compatible with Pinnacle's biosensors and third-party sensors.

KEY FEATURES

- Four independent channels
- Two terminal, fixed potential
- Synchronous channel sampling
- Maximum sampling rate: 4 Hz
- Current range: 0 - 20 uA
- Bias range: -2.048 to +2.048 V

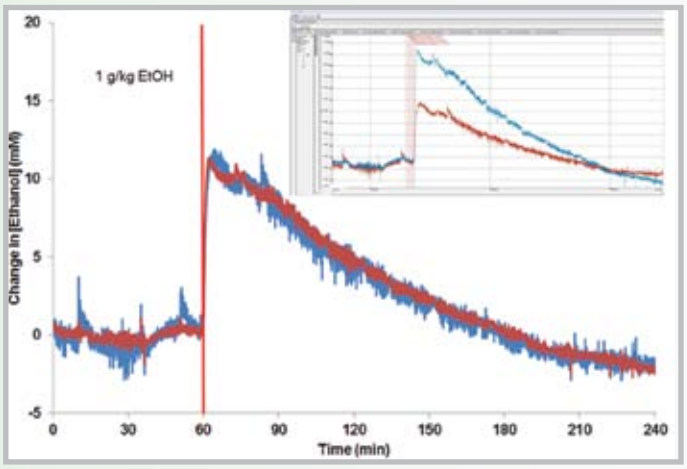
COMPATIBLE WITH THIRD-PARTY SENSORS

HARDWARE KIT	
8100-K4:	Desktop Potentiostat System
8102 -	Desktop potentiostat
8109 -	Sensor adapter cables (pkg. of 4)
8118 -	Power supply
8124 -	Shorting cap
8125 -	BNC to alligator leads cable (4)
8155 -	BNC test load (4)
9005 -	7-port powered USB hub
Cables, software, and manuals are also included.	

CALIBRATION KITS

In order to relate the *in vivo* current changes measured by a biosensor to actual changes in analyte concentration, it is necessary to calibrate the biosensor at the conclusion of the *in vivo* experiment. Pinnacle offers a number of *in vitro* calibration systems that allow the simultaneous calibration of up to four biosensors.

CALIBRATION KITS	
Product	**Kit #**
Tethered mouse *in vitro* calibration kit	7000-K1-T
Wireless rat *in vitro* calibration kit (use with BASi cannulas)	7000-K2-W-BAS



CORRELATING CURRENT TO CONCENTRATION

Shown in the image on the left are *in vivo* recordings from two alcohol biosensors implanted contralaterally in the cortex of a Wistar rat. An ethanol bolus (1 g/kg) was delivered at the sixty-minute mark. Data were transformed to changes in ethanol concentration based on each sensor's post-calibration. INSET: The raw, untransformed current (nA) from the two alcohol biosensors as acquired through Pinnacle's acquisition software.

EEG/EMG SYSTEMS

THREE-CHANNEL AND FOUR-CHANNEL BIOPOTENTIAL RECORDING SYSTEMS are available for sleep, seizure, and general behavioral paradigms in freely moving mice and rats. Both EEG/EMG systems use headmounted preamplifiers to produce exceptionally clean waveforms, even during animal movement. The four-channel system provides all the great features of the three-channel system along with an extra channel, configuration flexibility, and the added capability of incorporating simultaneous biosensor measurements. See the "System Features" chart to determine which system better fits your research needs.

TWO TURN-KEY SYSTEMS

SYSTEM FEATURES	3 CHANNEL	4 CHANNEL
Available for both mice and rats	✓	✓
Optimized for sleep and seizure experiments	✓	✓
No cable artifact	✓	✓
Adjustable gain and low-pass filters	✓	✓
Sampling rate up to 2000 Hz per channel	✓	✓
Digital input/output controls	✓	✓
Analog output option	✓	
Fully configurable channels		✓
Biosensor support		✓
Reconfigure via preamplifier exchange		✓

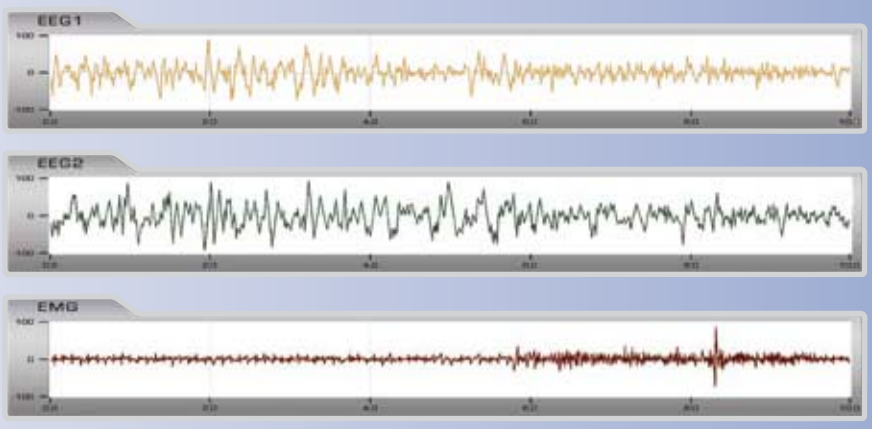
- **System Breakdown & How Preamplifiers Work:** Pages 10-11
- **Three- & Four-Channel Systems, Hardware & Accessory Kits:** Pages 12-13
- **Add a Biosensor to EEG/EMG Recordings:** Page 14

COMMON USES

SLEEP STUDIES · SEIZURE RESEARCH · DEPTH ELECTRODES · CORTICAL RECORDINGS · COGNITIVE STUDIES · LOCAL FIELD POTENTIAL

ADVANTAGES

- LOW NOISE
- TURN-KEY SYSTEM
- SIMPLE SURGERIES
- FREE ACQUISITION SOFTWARE
- ADVANCED ANALYSIS TOOLS
- SYNCHRONIZED VIDEO



Two channels of EEG data can be captured alongside EMG data using Pinnacle's three-channel biopotential recording system.

SYSTEM BREAKDOWN

OUR TURN-KEY SYSTEMS are engineered to deliver clean, artifact-free data. EEG and EMG waveforms are amplified and filtered at the head of the animal by a preamplifier. Signals are then passed through the low-torque swivel to the data conditioning and acquisition system for final-stage amplification and filtering. Each channel in our three- and four-channel systems features independent, adjustable gain and filter settings.

Data are collected using Pinnacle's free acquisition software, Sirenia®. The software allows users to view EEG/EMG recordings in user-defined time periods, manually score sleep, and review seizure events. All data can be configured for export to most spreadsheet and database programs and are compatible with our advanced analysis software packages. *See pages 17-19 for additional information on Pinnacle software.*

TETHERED SYSTEMS FOR RATS

COMMUTATOR

A Plastics One commutator is mounted above the cage. The commutator's two-plug setup allows for even rotation of the rotor.

□ 8214 ■ 8409

CABLE

An 18" tether from Plastics One connects the commutator to the preamplifier. The cable's wires are protected by a metal spring coil.

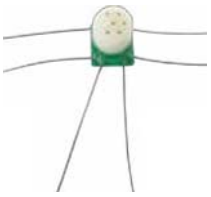
PREAMPLIFIER

Signals are amplified and filtered at the head of the animal using our preamplifiers, which ensures the delivery of clean, artifact-free data. A Plastics One screw connector is used to secure the preamplifier to the head of the animal.

□ 8213 ■ 8407

RAT HEADMOUNT

Prefabricated rat headmounts use Plastics One fittings mounted on a 9 mm X 9 mm board with EEG or EMG electrode wires attached. An additional two-pin electrode is used for 4 EEG configurations.



DATA CONDITIONING AND ACQUISITION

A data conditioning and acquisition system (DCAS) performs secondary amplification and filtering before sending data to Pinnacle's Sirenia® Acquisition software for collection via a USB connection.

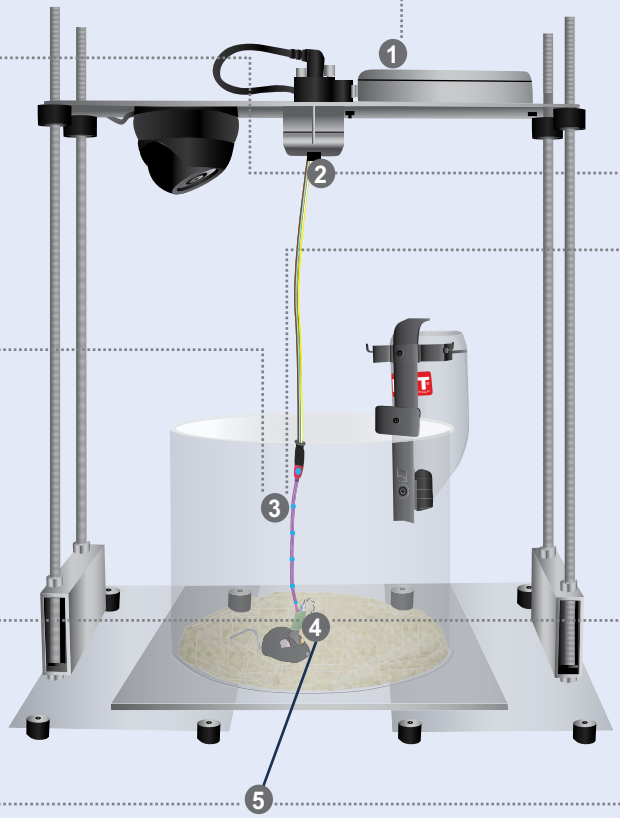
SPECIFICATIONS

- **Adjustable Sampling Rates:** 200 - 2,000 Hz
- **Software Configurable Low-Pass Filters:** 10 Hz - 1 kHz

□ 8206 ■ 8401

PRODUCT PART NUMBER KEY:

□ 3-Channel System ■ 4-Channel System



TETHERED SYSTEMS FOR MICE

COMMUTATOR

A low-torque commutator, which is mounted above the cage, allows for unencumbered freedom of movement.

Rotational Torque: <2 x 10^{-4} N-m

□ 8204 ■ 8408

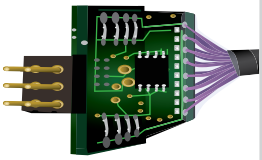
CABLE

A 14" tether connects the commutator to the preamplifier. Six insulated wires are banded together to create this lightweight cable that is ideal for use with very small animals.

PREAMPLIFIER

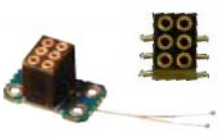
Signals are amplified and filtered at the head of the animal using our preamplifiers. This ensures the delivery of clean, artifact-free data. The mouse preamplifier connects to a headmount via a friction fit.

□ 8202 ■ 8406



MOUSE HEADMOUNT

Prefabricated headmounts reduce surgery time, allow for reproducible electrode placement, and provide ready-to-insert EMG leads.



Six-pin or eight-pin connectors support flexible electrode placement for customizable cortical or depth recordings.

HOW OUR PREAMPLIFIERS WORK

GAIN AND HIGH-PASS FILTERS

Pinnacle's high-gain preamplifiers perform X100 amplification (X10 in seizure rat configurations) of differential measurements between two electrodes. Each channel also features 0.5, 1.0, or 10 Hz high-pass filters. Use the chart below to identify the exact preamplifier specifications for each channel type in your selected configuration.

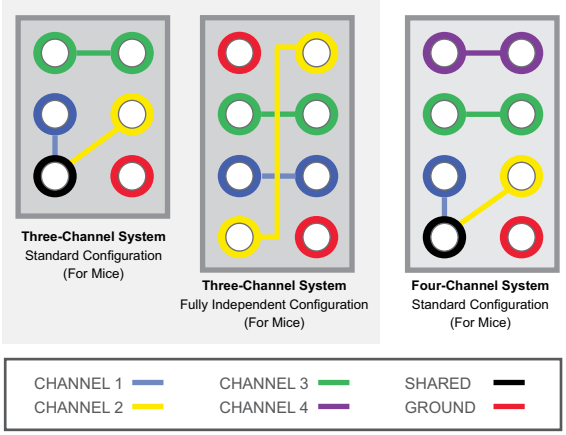
For example, a 2 EEG/1 EMG preamplifier configured for seizure studies in mice has a gain of X100 on all channels, 1.0 Hz high-pass filters on the EEG channels, and 10 Hz high-pass filters on the EMG channel.

MOUSE CONFIGURATIONS		GAIN	HIGH-PASS FILTERS
EEG Channel(s)	Seizure	X100	1.0 Hz
	Sleep	X100	0.5 Hz
EMG Channel	Seizure	X100	10 Hz
	Sleep	X100	10 Hz
RAT CONFIGURATIONS		**GAIN**	**HIGH-PASS FILTERS**
EEG Channel(s)	Seizure	X10	1.0 Hz
	Sleep	X100	0.5 Hz
EMG Channel	Seizure	X10	10 Hz
	Sleep	X100	10 Hz

SHARED AND FULLY INDEPENDENT CHANNELS

Standard three- and four-channel preamplifiers have two channels sharing a common electrode and either one or two independent channels, respectively. Fully independent, differential preamplifiers are also available. See diagrams below.

Perspective: Pins extending from preamplifier



CUSTOM CONFIGURATIONS AVAILABLE

Contact a Pinnacle representative
at **(785) 832-8866**

THREE CHANNEL SYSTEMS

Pinnacle's **THREE-CHANNEL TETHERED SYSTEM** allows researchers to simultaneously record three channels of EEG and/or EMG data. The data conditioning and acquisition system (DCAS) and preamplifier are preconfigured and ordered as a matching pair. Standard configurations include 2 EEG/1 EMG channels for sleep or seizure studies and 3 EEG channels for seizure research. Fully independent preamplifiers are also available. *Learn more about preamplifiers and how our turn-key systems work on pages 10-11.*

SYSTEMS FOR MICE

HARDWARE KITS

Configuration	Sleep	Seizure
2 EEG/1 EMG	8200-K1-SL	8200-K1-SE
2 EEG/1 EMG*	8200-K1-iSL	8200-K1-iSE
3 EEG		8200-K1-SE3
3 EEG*		8200-K1-iSE3

Contents:
- **8202 -** Mouse preamplifier
- **8204 -** Mouse commutator/swivel with 14" mounting plate
- **8206 -** Data conditioning and acquisition system

Cables for one animal, software, and manuals are also included. NOTE: Products 8202 and 8206 come in multiple varieties: SL, SE, SE3, DSL*, DSE*, and DSE3*.

*** Fully Independent**

ACCESSORY KITS

8200-K3-SL/SE: 2 EEG/1 EMG for Sleep or Seizure

8201 - Mouse headmount (4)	**8249 -** Test source
8209 - 0.10" screws (pkg. of 8)	**8254 -** 23-gauge needle (4)
8212 - 0.12" screws (pkg. of 8)	**8255 -** Multimeter
8226 - Twin pack of silver epoxy (2)	**9005 -** 7-port powered USB hub
8241-F - Screwdriver for EEG screws	

8200-K3-iSL/iSE: 2 EEG/1 EMG for Sleep or Seizure*

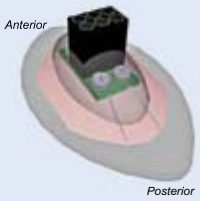
Components of this kit are the same as above except 8201 is replaced with 8431. In addition, it contains an 8-pin to 6-pin adapter (8272) and 20- 0.10" screws with wire leads (8403) instead of products 8209, 8212, and 8226.

8200-K3-SE3: 3 EEG for Seizure

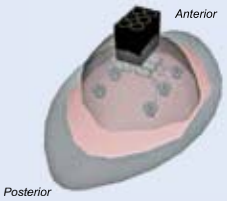
Components of this kit are the same as above except 8201 is replaced with 8235-SM. In addition, it contains 24- 0.10" screws with wire leads (8403) instead of products 8209, 8212, and 8226.

8200-K3-iSE3: 3 EEG for Seizure*

Components of this kit are the same as above except 8201 is replaced with 8415-SM. In addition, it contains an 8-pin to 6-pin adapter (8272) and 28- 0.10" screws with wire leads (8403) instead of products 8209, 8212, and 8226.



2 EEG / 1 EMG for Mice



3 EEG for Mice

SYSTEMS FOR RATS

HARDWARE KITS

Configuration	Sleep	Seizure
2 EEG/1 EMG	8200-K2-SL	8200-K2-SE
3 EEG		8200-K2-SE3

Contents:
- **8206 -** Data conditioning and acquisition system
- **8213 -** Rat preamplifier
- **8214 -** Rat commutator/swivel with 14" mounting plate

Cables for one animal, software, and manuals are also included. NOTE: Products 8206 and 8213 come in three varieties: SL, SE, and SE3.

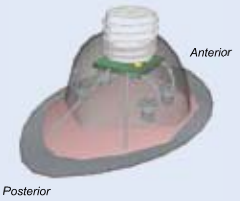
ACCESSORY KITS

8200-K4-SL/SE: 2 EEG/1 EMG for Sleep or Seizure

8112 - Drill bit	**8249 -** Test source
8239 - Rat headmount (4)	**8255 -** Multimeter
8241-S - Screwdriver for 1/8" screws	**9005 -** 7-port powered USB hub
8247 - 1/8" screws with wire leads (16)	

8200-K4-SE3: 3 EEG for Seizure

Components of this kit are the same as above except for the quantity of 8247 (24). In addition, 8239 is replaced with 8239-SE3.



2 EEG / 1 EMG for Rats

All accessory kits contain items needed for completion of four or six surgeries. All quantities are (1) unless otherwise noted after the product description.

HAVE YOUR OWN AMPLIFIER?

Learn more about using Pinnacle's preamplifiers with third-party systems on page 23.

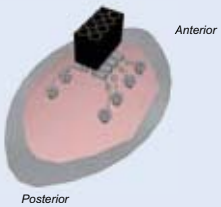
DISPOSABLE ITEMS

FOR RATS

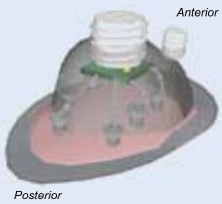
Item #	Product
8112	Drill bit
8239	2 EEG/1 EMG rat headmount
8239-SE3	3 EEG rat headmount
8247	1/8" screws with wire leads
8425	2-pin electrode

FOUR CHANNEL SYSTEMS

The **FOUR-CHANNEL TETHERED SYSTEM** supports up to four biopotential input channels. This system is among the most flexible of Pinnacle's hardware devices because users can easily modify the configuration by changing only the preamplifier. Standard configurations include 3 EEG/1 EMG channels and 4 EEG channels for seizure research. *For system and preamplifier specifications, refer to pages 10-11.*



4 EEG for Mice



4 EEG for Rats

SIMPLE SURGERIES

Pinnacle's prefabricated headmounts and connectors provide fast and easy solutions for connecting electrodes to preamplifiers. Stainless steel screws affix to the skull, doubling as anchors and electrodes for EEG data acquisition. Depth electrodes can be soldered to connectors for LFP recordings. For configurations supporting muscle movement, EMG leads easily insert into the back or neck muscles.

SYSTEMS FOR MICE

HARDWARE KITS

Configuration	Sleep	Seizure
3 EEG/1 EMG		8400-K1-SE31M
4 EEG		8400-K1-SE4

Contents:

- **8401 -** Data conditioning and acquisition system
- **8406 -** Mouse preamplifier
- **8408 -** Mouse commutator/swivel with 18" mounting plate

Cables for one animal, software, and manuals are also included. NOTE: Product 8406 comes in multiple varieties: SE31M and SE4.

ACCESSORY KITS

8400-K3-SE31M: 3 EEG/1 EMG for Seizure

8241-F - Screwdriver for EEG screws	**8403 -** 0.10" screws with wire leads (36)
8249 - Test source	**8431 -** 3 EEG/1 EMG headmount (6)
8254 - 23-gauge needle (6)	**8432 -** 8-pin to 6-pin adapter
8255 - Multimeter	**9005 -** 7-port powered USB hub

8400-K3-SE4: 4 EEG for Seizure

Components of this kit are the same as above except for the quantity of 8403 (48). In addition, product 8431 is replaced with 8415-SM.

SYSTEMS FOR RATS

HARDWARE KITS

Configuration	Sleep	Seizure
4 EEG		8400-K2-SE4

Contents:

- **8401 -** Data conditioning and acquisition system
- **8407 -** Rat preamplifier
- **8409 -** Rat commutator/swivel with 18" mounting plate

Cables for one animal, software, and manuals are also included. NOTE: Product 8407 comes in multiple varieties. This kit includes an 8407-SE4.

ACCESSORY KITS

8400-K4-SE4: 4 EEG for Seizure

8112 - Drill bit	**8249 -** Test source
8239-SE3 - 3 EEG headmount (4)	**8255 -** Multimeter
8241-S - Screwdriver for EEG screws	**8425 -** 2-pin electrode (4)
8247 - 1/8" screws with wire leads (24)	**9005 -** 7-port powered USB hub

Headmounted Amplification: Ensures clean, artifact-free data

Ease of Use: Systems are easily assembled for immediate use

Turn-Key System: Provides complete solutions for data acquisition and analysis

FOR MICE

Item #	Product
8201	Mouse headmount
8209	0.10" screws (pkg. of 8)
8212	0.12" screws (pkg. of 8)
8226	Twin pack of silver epoxy
8235-SM	6-pin connector

Item #	Product
8254	23-gauge needle
8403	0.10" screws with wire leads
8415-SM	8-pin connector
8431	3 EEG/1 EMG headmount

ADD SYNCHRONIZED VIDEO

See page 16 for details.

ADD A BIOSENSOR CHANNEL

ANY PINNACLE BIOSENSOR can be used in conjunction with our four-channel EEG/EMG system for recording up to two simultaneous biosensor channels. Adding biosensors enables the correlation of biopotential and neurochemical activity in freely moving mice and rats, making the system perfect for unlocking new findings during sleep, seizure, and behavioral studies. It is also possible for the system to acquire two biosensor inputs on a single channel. This allows for the simultaneous capture of data from three biopotential and two biosensor signals. *Learn more about biosensors on pages 4-5.*

SYSTEMS FOR MICE

HARDWARE KITS

Configuration	Sleep	Seizure
1 EEG/1 EMG/2 Biosensor	8400-K1-SL-2BIO	8400-K1-SE-2BIO
2 EEG/1 EMG/1 Biosensor	8400-K1-SL	8400-K1-SE
2 EEG/1 EMG/2 Biosensor	8400-K1-5SL	8400-K1-5SE
3 EEG/1 Biosensor		8400-K1-SE3
3 EEG/2 Biosensor		8400-K1-5SE3

Contents:
- **8401 -** Data conditioning and acquisition system
- **8406 -** Mouse preamplifier
- **8408 -** Mouse commutator/swivel with 18" mounting plate

Cables for one animal, software, and manuals are also included.
NOTE: Product 8406 comes in multiple varieties: SL, SE, SE3, SL-2BIO, SE-2BIO, 5SL, 5SE, and 5SE3.

ACCESSORY KITS

8400-K3-SL/SE-2BIO: 1 EEG/1 EMG/2 Biosensor for Sleep or Seizure

7032 - BASi mouse cannula (12)	**8254 -** 23-gauge needle (6)
7035-M-BAS - BASi cannula probe holder (2)	**8255 -** Multimeter
8134 - Test load (2)	**8402 -** EEG/EMG/Bio headmount (6)
8209 - 0.10" screws (2 pkgs. of 8)	**8403 -** 0.10" screws with wire leads (12)
8241-F - Screwdriver for EEG screws	**8429-M -** Mouse BASi stylet ground
8249 - Test source	**9005 -** 7-port powered USB hub

8400-K3-SL/SE: 2 EEG/1 EMG/1 Biosensor for Sleep or Seizure

Components of this kit are the same as above except quantities for 7032 (6), 7035-M-BAS (1), 8209 (1 pkg. of 8), and 8403 (18).

8400-K3-5SL/5SE: 2 EEG/1 EMG/2 Biosensor for Sleep or Seizure

Components of this kit are the same as above except quantities for 8209 (1 pkg. of 8) and 8403 (18).

8400-K3-SE3: 3 EEG/1 Biosensor for Seizure

Components of this kit are the same as above except quantities for 7032 (6), 7035-M-BAS (1), 8209 (1 pkg. of 8), and 8403 (30). In addition, product 8402 is replaced with 8235-SM.

8400-K3-5SE3: 3 EEG/2 Biosensor for Seizure

Components of this kit are the same as above except quantities for 8209 (1 pkg. of 8) and 8403 (30). In addition, product 8402 is replaced with 8235-SM.

SYSTEMS FOR RATS

HARDWARE KITS

Configuration	Sleep	Seizure
2 EEG/1 EMG/1 Biosensor	8400-K2-SL	8400-K2-SE
3 EEG/1 Biosensor		8400-K2-SE3

Contents:
- **8401 -** Data conditioning and acquisition system
- **8407 -** Rat preamplifier
- **8409 -** Rat commutator/swivel with 18" mounting plate

Cables for one animal, software, and manuals are also included.
NOTE: Product 8407 comes in multiple varieties: SL, SE, and SE3.

ACCESSORY KITS

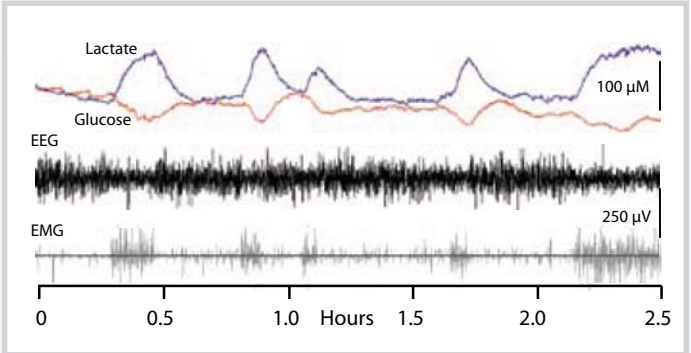
8400-K4-SL/SE-BAS: 2 EEG/1 EMG/1 Biosensor for Sleep or Seizure

7030 - BASi rat cannula (4)	**8247 -** 1.8" screws with wire leads (12)
7035-R-BAS - BASi cannula probe holder	**8249 -** Test source
8111 - 1/8" screws (pkg. of 12)	**8255 -** Multimeter
8112 - Drill bit	**8427 -** Test load (2)
8239 - Rat headmount (4)	**8429-BAS -** BASi stylet ground
8241-S - Screwdriver for EEG screws	**9005 -** 7-port powered USB hub

8400-K4-SE3-BAS: 3 EEG/1 Biosensor for Seizure

Components of this kit are the same as above except for the quantity of 8247 (20). In addition, product 8239 is replaced with 8239-SE3.

COMBINED EEG/EMG/BIOSENSOR SYSTEMS



EEG and EMG waveforms are plotted simultaneously with calibrated biosensor traces for lactate and glucose recorded from a single animal.

Biosensors sold separately.

All accessory kits contain items needed for completion of four or six surgeries.
All quantities are (1) unless otherwise noted after the product description.

SLEEP DEPRIVATION SYSTEM

Pinnacle's **AUTOMATED SLEEP DEPRIVATION SYSTEM** offers a unique solution for sleep deprivation and fragmentation studies of mice and rats by eliminating the need for direct human intervention. The rotation of a metal bar positioned above the cage bedding disturbs the animal in a manner similar to gentle handling, preventing sleep without imposing forced exercise. Studies have shown the system to be an effective method for both long-term sleep fragmentation and total sleep deprivation studies. It is sold as either a Stand Alone System or a Feedback System, which uses EEG/EMG activity to determine sleep state.

STAND ALONE SYSTEM

Pinnacle's Stand Alone Sleep Deprivation system allows users to program the system to turn on or off according to the research schedule. Researchers can use Pinnacle's EEG/EMG and biosensor recording systems or use the system in conjunction with third-party recording systems. The software scheduler can be set to a second-by-second basis, allowing for sleep fragmentation studies. For shift work simulation studies, each system can be programmed to turn on or off on an hourly, daily, weekly, or monthly user-defined schedule. Once the schedule is set, the unit operates independently and can be moved to any location. Users can upgrade to feedback mode at any time.

FEEDBACK SYSTEM

The Feedback System provides all the functionality of the Stand Alone system along with the capability of adding real-time EEG and EMG feedback to ensure the bar rotates only when the animal is entering a sleep-like state. Rotation of the bar ceases once the animal has been awake for a user-defined period of time, limiting excessive exercise and stress effects normally associated with constant stimulus applications.

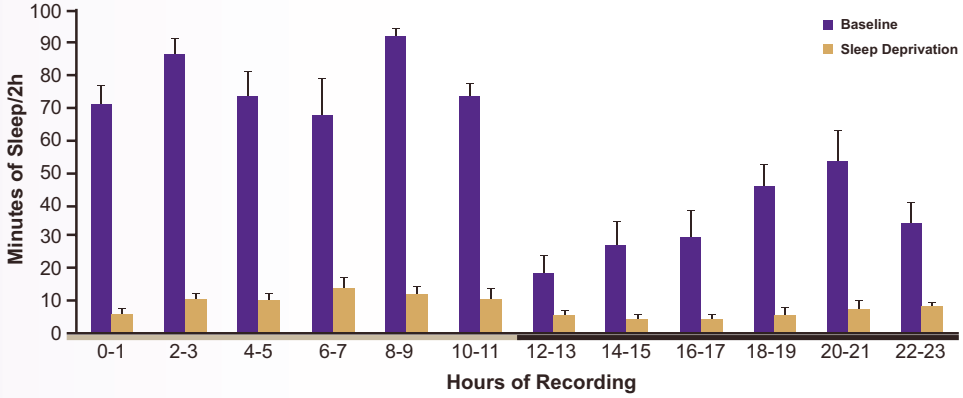
In Feedback Mode, users can perform yoked controlled experiments in which multiple sleep deprivation systems can be slaved together to operate under a uniform set of experimental parameters. When connected together in software, two or more systems can be programmed to turn on or off simultaneously.

AUTOMATED SLEEP DEPRIVATION SYSTEMS

Product	Item #
Stand Alone for Mice	9000-K5-S
Feedback for Mice	9000-K5
Stand Alone for Rats	9000-K6-S
Feedback for Rats	9000-K6

KEY FEATURES

- Gently restricts sleep without unnecessary exercise or stress
- Performs short-term, long-term, or chronic partial sleep deprivation studies
- Automatic feedback and stand-alone modes
- Yoked control functionality
- Minimizes resources needed to manually sleep deprive animals



EFFECTIVENESS OF SLEEP DEPRIVATION SYSTEM ON MICE

Comparison of baseline sleep (purple bars) with a 24-hour sleep deprivation period (gold bars) using rotating bar and active EEG feedback. Six mice (male, C57BL6) were maintained on a 12-hour lights-on (horizontal tan)/ 12-hour lights-off (horizontal black) schedule. EEG and EMG activity was recorded for 24 hours (baseline). During the following 24 hours (SD), baseline data were used to program individual sleep deprivation units to rotate when the mouse entered a sleep-like state. Vertical bars represent sleep time in 2-hour bins.

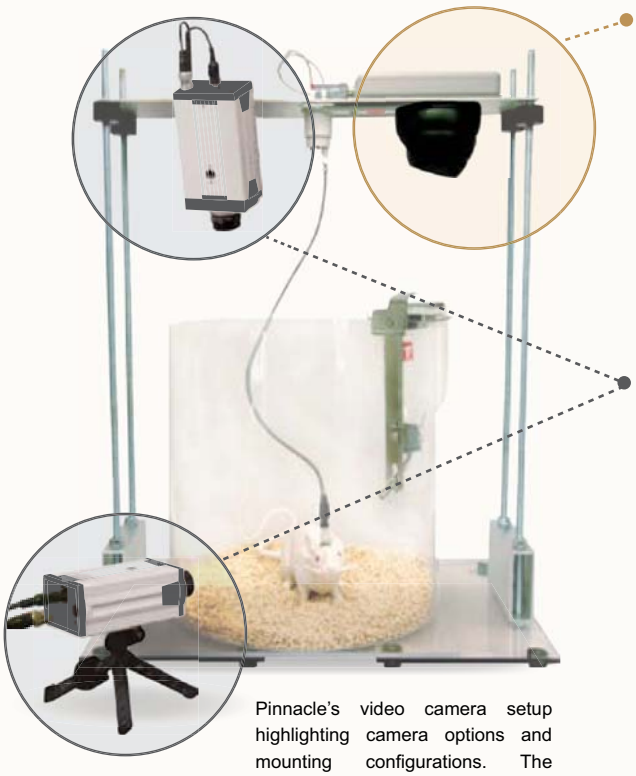
SYNCHRONIZED VIDEO CAPABILITY

Pinnacle's **VIDEO SYSTEM** can record up to four simultaneous *in vivo* experiments with synchronized video collection on one computer. Pinnacle's Sirenia® software automatically synchronizes recorded video with EEG/EMG waveforms and biosensor activity to provide an accurate visual representation of animal activity and behavior. Synchronized video can be ordered as an accessory to new systems or easily added to any research experiment. The base video package includes a preconfigured computer with ample hard disk storage, all necessary cables, and a Sirenia® software license key. Two camera options are available with different optics. Up to four cameras can be added to a single video system.

SYNCHRONIZED VIDEO SYSTEMS

Product	Item #
1-Camera Synchronized Video System	9000-K1
2-Camera Synchronized Video System	9000-K2
3-Camera Synchronized Video System	9000-K3
4-Camera Synchronized Video System	9000-K4

Each system comes with a quantity of cables and licenses matching the number of cameras each kit supports.
Cameras are sold separately.



Pinnacle's video camera setup highlighting camera options and mounting configurations. The independent IR source is not shown.

OPTION 1:

Pinnacle's dome camera package includes a camera that mounts above the cage. Built-in infrared illumination adjusts to lighting conditions automatically, allowing recording in reduced lighting and complete darkness.

OPTION 2:

The box camera has improved optics and low-light performance, as well as flexibility in mounting options. It can be mounted above the cage using Pinnacle's standard mounting plate, on the cage stand, or to a tripod for recording at lower angles. A separate, automatic infrared illumination source allows video capture in conditions of reduced lighting and complete darkness.

DOME CAMERA KIT

9000-K9: Dome Camera System

9022 - Dome camera with built-in IR source

BOX CAMERA KIT

9000-K10: Box Camera System

9056 - Box camera	**9058 -** Mounting clamp
9057 - IR source	**9056-LENS -** 4 mm lens

ADDITIONAL PRODUCTS

Product	Item #
Variable Focus Lens	9056-VF
Tripod	9059

KEY FEATURES

Record in color or grayscale and from any angle

Flexible file size management

Resolution up to 640 x 480 pixels and 30 frames per second

Unrestricted video playback

Record in low light or complete darkness

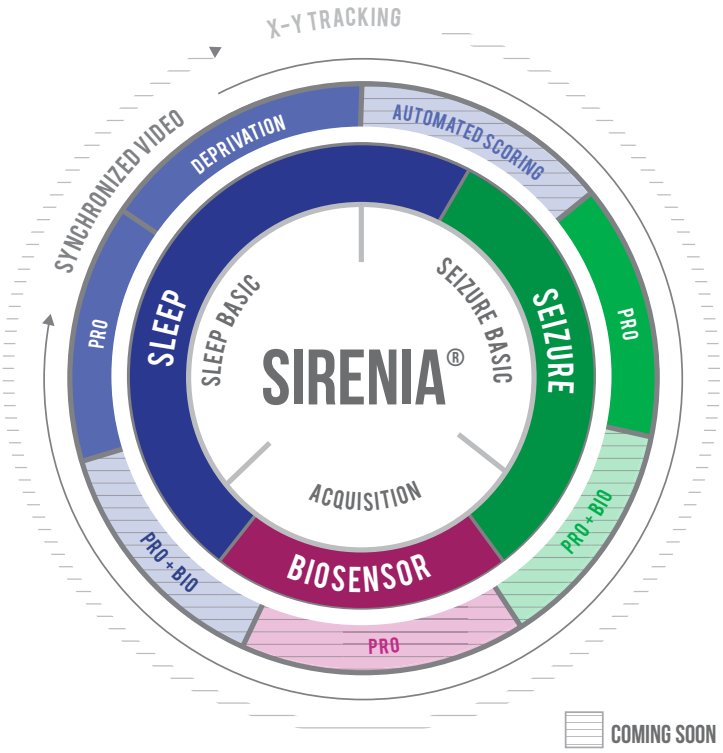
Synchronized Video with data recordings

Integrated video can be added to any Pinnacle recording system through Sirenia® software. Video is synchronized within 100 milliseconds to simultaneous EEG, EMG, or biosensor data.

SIRENIA® SOFTWARE

All Pinnacle hardware is shipped with our **FREE SIRENIA® SOFTWARE PACKAGE**. This package features an acquisition platform, as well as basic review and analysis programs for biosensor, sleep, and seizure recordings. For users of our video systems, camera capture is seamlessly integrated and synchronized with biosensor and biopotential data.

In addition, Pinnacle currently offers two advanced analysis software programs that automate the sleep scoring and seizure identification processes. *Learn more about Sirenia® Sleep Pro and Sirenia® Seizure Pro on pages 18-19.*



THIRD-PARTY DATA STREAMS

Sirenia® supports the integration of third-party data streams via a National Instruments I/O module. These data can be simultaneously recorded along with Pinnacle's biopotential and biosensor data.

Product	Item #
National Instruments I/O module	9032

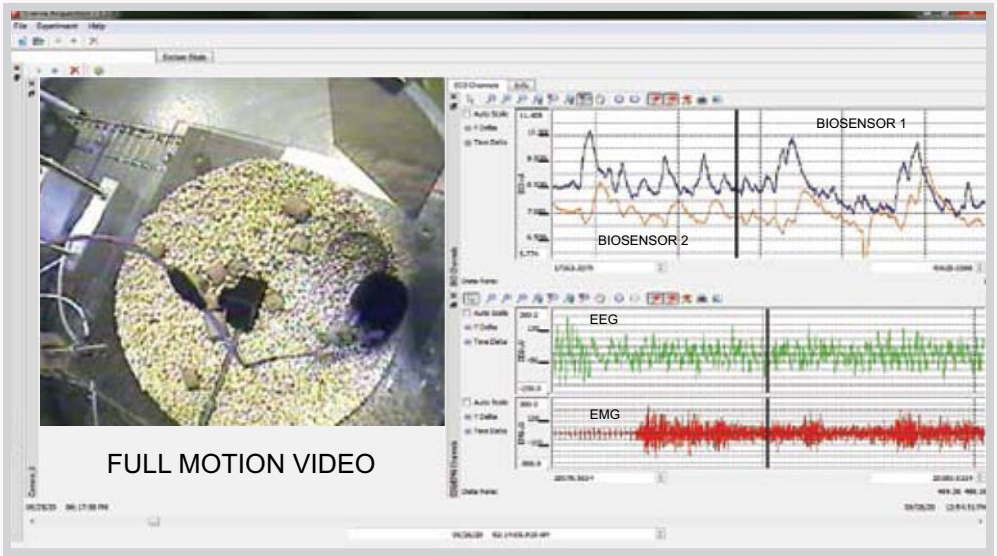
DOWNLOAD SIRENIA® FOR FREE

at pinnaclet.com/sirenia.html

ACQUIRE

REVIEW

ANALYZE



Two biosensor traces and EEG/EMG waveforms are recorded simultaneously with full-color video using Sirenia® Acquisition.

KEY FEATURES

- All Pinnacle hardware can be recorded to one platform
- Basic seizure and sleep analysis tools
- Flexible data management
- Multiple export capabilities
- Record synchronized video with all Pinnacle recording devices
- I/O functionality
- Data consolidation
- Free updates

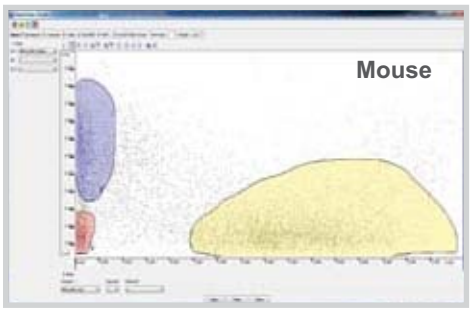
SIRENIA® SLEEP PRO

SIRENIA® SLEEP PRO was designed specifically with sleep researchers in mind. It offers automated power analysis, semi-automated scoring methods, and advanced tabular and graphical analysis for investigation of sleep data sets. All EEG/EMG and video data sets recorded with Pinnacle software, as well as third-party EDF and text files, can be imported for analysis.

SCORING TOOLS

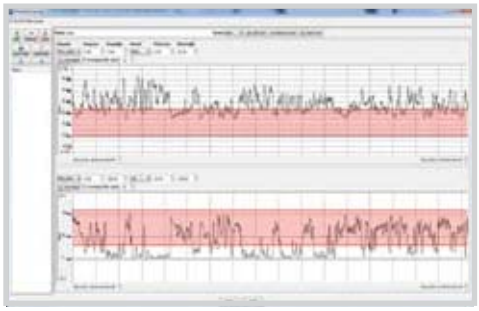
- Semi-automated scoring:
  - *Cluster*
  - *Threshold*
- Customizable scoring keys
- Real-time hypnograms
- Spectral plots
- Heat maps

CLUSTER SCORING



Cluster scoring allows rapid scoring of similar epochs based on power analysis plots. Clusters of epochs can be easily scored by drawing circles around similar groups and assigning a stage.

THRESHOLD SCORING



Threshold scoring uses power spectral analysis to create rule sets based on adjustable power boundaries in one or more channels and automatically scores epochs that fall within those boundaries.

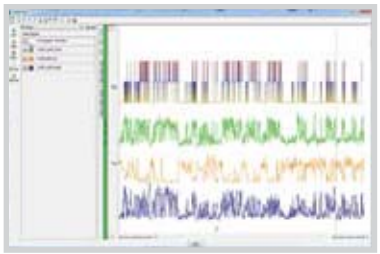
AUTOMATED ANALYSIS

- Power analysis
- Sleep stage and sleep bout analysis
- Peak frequency analysis
- Compare user scores

User-configured sleep stages and sleep bouts are automatically generated for fast and easy analysis. Analysis can be broken down into light and dark cycles as well as day-by-day reports.

CUSTOMIZABLE PLOTTING

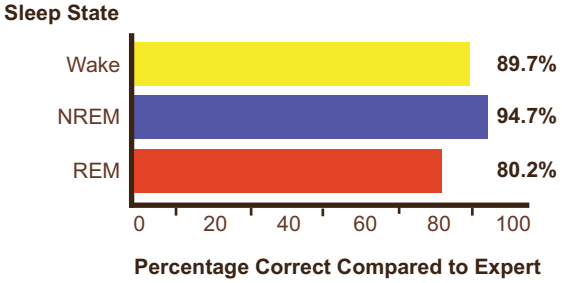
- Time comparison plots
- Automatic graph generation
- Plot multiple power bands with hypnogram and other data



With customized plotting features, data can be plotted on top of one another (i.e., theta/delta bands) and zoomed in and out to view detailed changes, providing a powerful and innovative way to review and analyze data.

ACCURACY OF SLEEP PRO SOFTWARE

A combination of cluster, threshold, and manual scoring tools were used by four experienced and novice scorers to separately score three different **mouse data** files. All files were compared to expert hand-scored data files. The overall average agreement of the four scorers for all the files as compared to the expert is shown below.



SIRENIA® SLEEP PRO	
Product	**Item #**
Sirenia® Sleep Pro Analysis Software	9035

The software package can be installed on multiple computers, though each seat is limited to one computer running the program at a time. Purchase includes one year of free upgrades. Contact Pinnacle for additional package options.

30-DAY FREE TRIAL

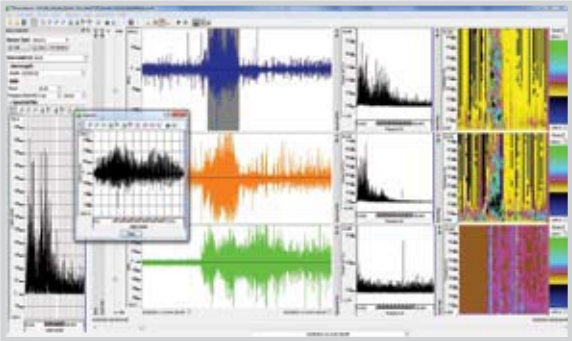
Download the 30-day free software trials at **www.pinnaclet.com/sleepPRO.html and www.pinnaclet.com/seizurePRO.html.**

Contact a Pinnacle representative for your key:
(785) 832-8866 or sales@pinnaclet.com

SIRENIA® SEIZURE PRO

The **SIRENIA® SEIZURE PRO** advanced analysis package provides a platform for quickly identifying and analyzing user-defined seizure events over a given time period. Once verified, events are logged in a database, and EEG/EMG data are automatically analyzed and stored to create customizable reports and graphs of aggregate seizure data. Third-party EDF files can be imported for analysis.

IDENTIFICATION AND LOGGING TOOLS



Possible seizure events are identified and marked by user-configured parameters, including Root Mean Square (RMS) power, line length, and frequency range. Users can define baseline or seizure parameters for individual animals by highlighting a portion of data. The software scans the entire file and annotates data matching the defined parameters. Users review and confirm seizure events, adjust the analysis window (if necessary), and log EEG/EMG data for advanced analysis. Spectral plots and heat maps are available to confirm seizure events. Racine's scale ratings, seizure classification, and notes can be added to any logged event for future reporting.

AUTOMATED ANALYSIS

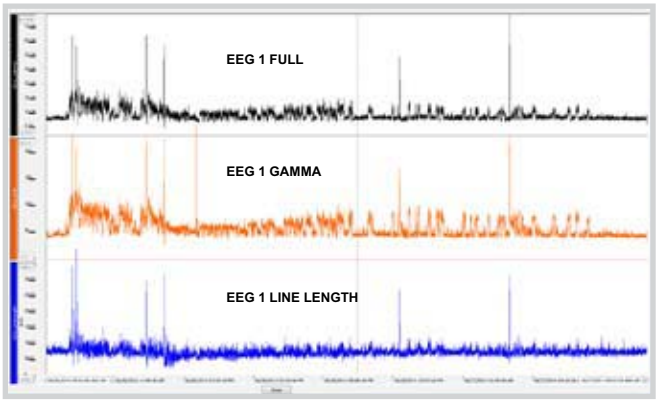
When automated analysis is performed on stored EEG/EMG data, the characteristics of each seizure event are quantified over time. The following seizure characteristics are included in the analysis:

- Peak frequency
- Seizure duration
- Percentages of power frequency bands
- Time from last seizure
- Line length
- Peak voltage

All computed data can be exported for use in external spreadsheet programs. In addition, EEG/EMG data with video can be consolidated in user-defined time segments around marked seizure events for smaller file management. Playback of EEG/EMG data with synchronized video can be exported as an AVI file for use in publications and presentations.

CUSTOMIZABLE GRAPHING

Customizable plots and graphs provide users a powerful and innovative way to review and analyze seizure data. Power spectra bands, spectrograms, and timelines of user-defined seizure characteristics are generated using these tools. All charts and graphs can be easily saved as high-resolution images for use in publications and presentations.



ACCURACY OF SEIZURE DETECTION

Seizure detection was performed using RMS power and line length separately on five individual **mouse data** files. All files were compared to an expert hand-scorer's files. Agreement of the two detection methods as compared to the expert is shown below.

	# of Seizure Events Marked	Accuracy vs. Expert Scorer	# of False Positives
Expert Scorer	21	N/A	N/A
RMS Power	23	100%	2
Line Length	21	100%	0

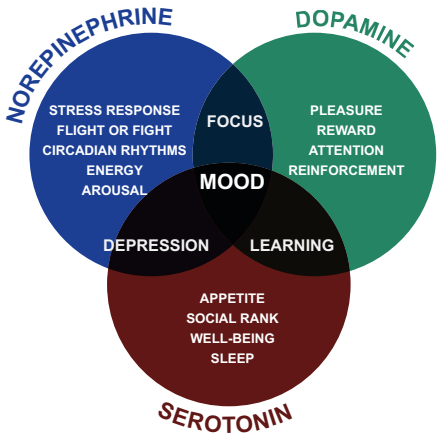
Data courtesy of Drs. Philip Haydon and Jerome Clasadonte (Expert Scorer)
Tufts University School of Medicine, Department of Neuroscience

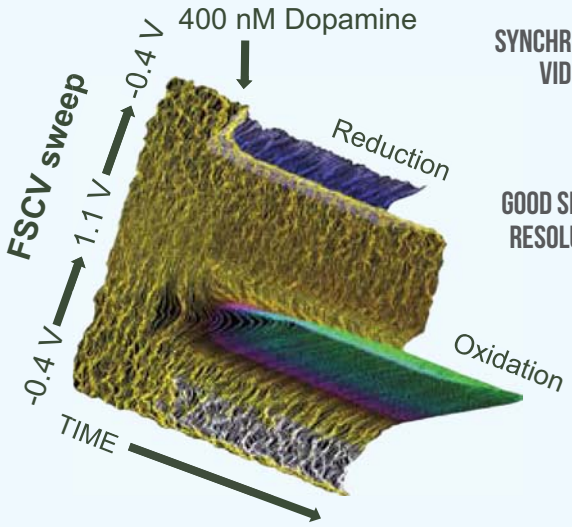
SIRENIA® SEIZURE PRO	
Product	**Item #**
Sirenia® Seizure Pro Analysis Software	9037

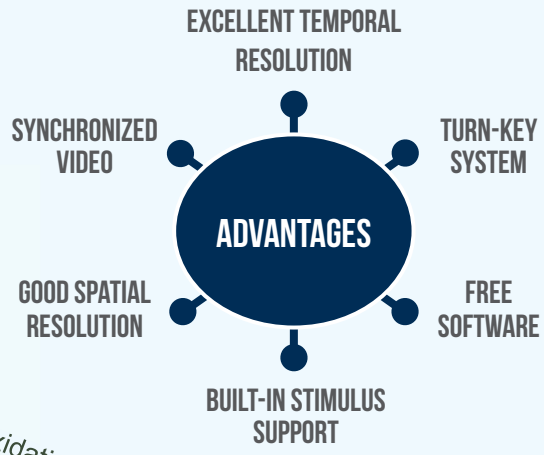
The software package can be installed on multiple computers, though each seat is limited to one computer running the program at a time. Purchase includes one year of free upgrades. Contact Pinnacle for additional package options.

FAST SCAN CYCLIC VOLTAMMETRY SYSTEM

Pinnacle's **FAST SCAN CYCLIC VOLTAMMETRY (FSCV) SYSTEM** is robust, turn-key, and specifically designed to simplify the measurement of catecholamines (i.e., dopamine, norepinephrine, and serotonin). It functions by rapidly cycling a voltage across an implanted carbon fiber sensor and measuring the resultant current. Both the tethered system for mice and the wireless system for rats have built-in support for controlling an external stimulus. The system is shipped with Pinnacle's 8500 software.







SWEEP SPECS

Voltage span:	-1.1 V to +1.3 V
Range:	250 - 400 V/s
Sweeps/second:	5 - 10
Points/sweep:	1000

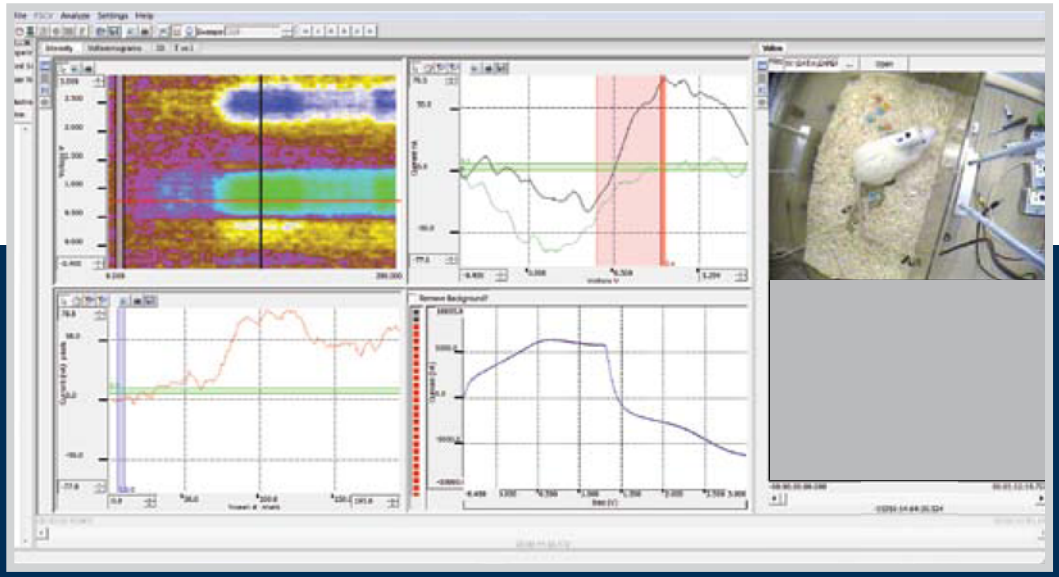
Pinnacle offers a complete line of carbon fiber sensors that have been optimized for FSCV applications.

SEE PAGES 4-5 FOR MORE INFORMATION

SOFTWARE FEATURES

The 8500 software supports traditional, short recording paradigms (recordings of two minutes or less) as well as longer-term recordings using an extended, continuous mode.

- Background subtraction
- Heat maps
- 3D visualization
- User-selectable filters
- Animated voltammograms
- Data export



A screenshot of Pinnacle's 8500 software with integrated video.

TETHERED SYSTEM FOR MICE

The **TETHERED FSCV SYSTEM** allows researchers to harness the powerful genetics of the mouse model to address underlying mechanisms of biogenic neurotransmitter release and function. A headmounted FSCV board sends signals through a low-torque commutator to an interface box that streams data to the host PC.

Pinnacle's tethered FSCV system.

HARDWARE KITS

8500-K1: FSCV Mouse System (tethered)

- **8408 -** Mouse commutator with 18" mounting plate
- **8503 -** Tethered FSCV headstage
- **8504 -** FSCV interface box

Cables for one animal, software, and manuals are also included.

ACCESSORY KITS

8500-K3: FSCV Accessories for Mice (tethered)

7033 - Bio-only headmount (4)	**8254 -** 23-gauge needle (4)
7036 - Clamp rod	**8509 -** 100K test load
7037 - Probe clamp accessory	**8510 -** 100M test load
7039 - Allen wrench	**9005 -** 7-port powered USB hub
8212 - 0.12" screws (pkg. of 8)	**9033 -** NiMH batteries (pkg. of 4)
8241-F - Screwdriver for mouse screws	**9034 -** Battery charger

KEY FEATURES

- SWEEP RATE: 10 SWEEPS/SECOND
- 1000 POINTS/SWEEP
- HEADMOUNTED AMPLIFICATION
- LOW-TORQUE SWIVEL

CALIBRATION KIT

Product	Item #
FSCV Calibration Kit*	8500-K5

*** Used for mouse and rat systems**

WIRELESS SYSTEM FOR RATS

The **WIRELESS RAT SYSTEM USES BLUETOOTH®** to transmit data. The system resides in a headmounted enclosure and wirelessly transmits data to a computer. The battery is easily accessible and readily exchangeable in real-time to support extended recordings. The system is ideal for mazes and enclosed environments, such as metabolic and behavioral chambers.

HARDWARE KITS

8500-K2: FSCV Rat System (wireless)

- **8501 -** Wireless FSCV board
- **8502 -** Bluetooth® dongle
- **9052 -** USB extension cable

Software and manuals are also included.

ACCESSORY KITS

8500-K4: FSCV Accessories for Rats (wireless)

7036 - Clamp rod	**8506 -** Battery with cover
7038 - Probe clamp accessory	**8507 -** Rat Hat top
7039 - Allen wrench	**8508 -** Rat Hat bottom (4)
8111 - 1/8" screws (pkg. of 12)	**8509 -** 100K test load
8112 - Drill bit	**8510 -** 100M test load
8147-A - Hex screwdriver	**9024 -** Battery charger
8241-S - Screwdriver for 1/8" screws	

Pinnacle's wireless FSCV system.

KEY FEATURES

- SWEEP RATE: 5 SWEEPS/SECOND
- 1000 POINTS/SWEEP
- BLUETOOTH® TRANSMISSION
- RECORD FROM MULTIPLE ANIMALS WITHIN THE SAME ROOM

Carbon fiber sensors and Ag/AgCl reference electrodes are sold separately.

DISPOSABLE ITEMS

FOR MICE

Item #	Product
7033	Bio-only headmount
8212	0.12" screws (pkg. of 8)
8254	23-gauge needle
9033	NiMH batteries (pkg. of 4)

FOR RATS

Item #	Product
8111	1/8" screws (pkg. of 12)
8112	Drill bit
8506	Battery with cover
8508	Rat Hat bottom

ANIMAL HOUSING

CIRCULAR CAGES AND CAGE ACCESSORIES are designed to allow rodents to freely move around a cage while connected to a tether. All cages are made of ¼" clear acrylic and are suitable for use with most commercial cage washing equipment. Multiple sizes are available.

VIVARIUM PRODUCTS

Product	Item #
Cage lid for mice	8265-M
Cage lid for rats	8265-R
Cage extender for mice	8228-4ex
Cage extender for rats	8238-4ex
Cage for mice (10" diameter, 8" tall)	8228
Cage for rats (12" diameter, 12" tall)	8238
Cage for rats (14" diameter, 12" tall)	8273
Cage stand	9009

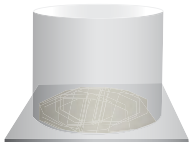
CAGE LID

Cage lids allow for additional containment of active animals. The design provides security without compromising natural cable movement. Lids can be easily removed for cleaning and feeding.

CAGE EXTENDER

Increase the height of our standard cages using cage extenders. The extenders fit snugly on top of Pinnacle's cages and add 4" (per extension) to cage height.

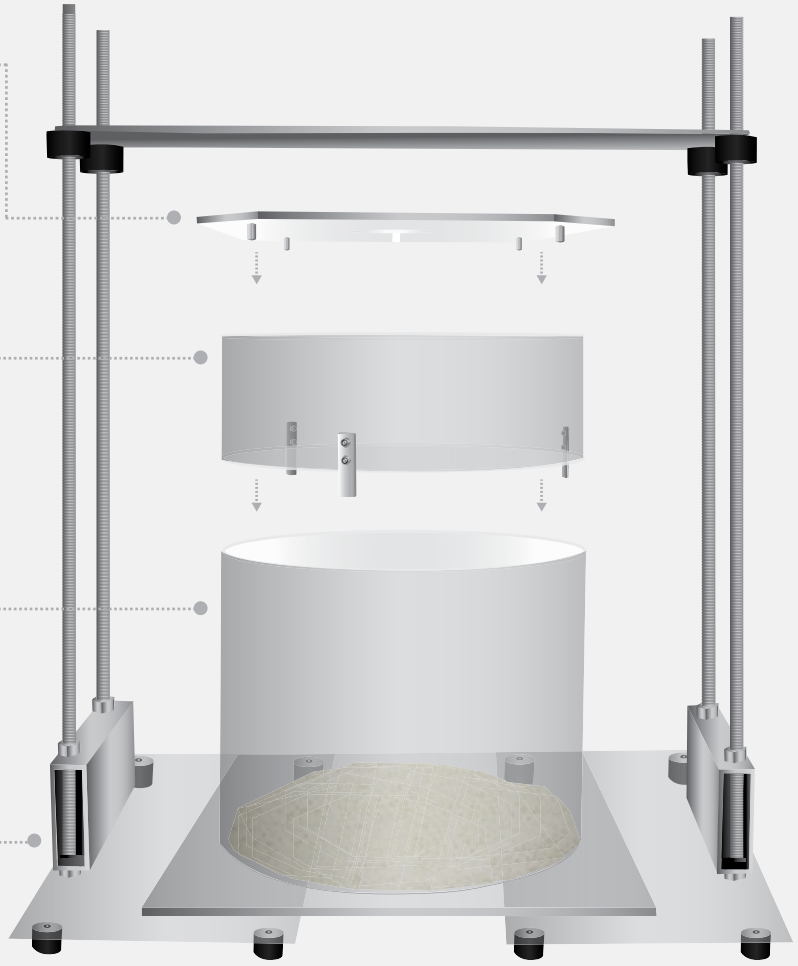
CAGE



Pinnacle's cages are ideal for rodent research because their circular design allows the animal to move freely around the circumference of the cage without creating too much slack in the cable when the animal rests near cage center. The open top makes cleaning and feeding easy and accessible. One water bottle, which attaches to the side of the cage, is included with each purchase.

CAGE STAND

Pinnacle's stands accommodate a single animal cage and mounting plate. The standard stand's split design makes it compatible with both mouse and rat cages and all of Pinnacle's tethered recording systems. It is adjustable to 24" tall.



NEED EXTRAS?

Product	Item #
Water bottle with holder	8251
14" mounting plate	8258
18" mounting plate	8426

CUSTOM FOOD HOPPER

Cages with an integrated, external food hopper are also available. Contact a Pinnacle representative for additional information.

MISCELLANEOUS ITEMS

HANDHELD ISOLATED POTENTIOSTAT

This general purpose, wireless, one-channel potentiostat can be used for a wide range of amperometric systems, including lab-on-chip and biosensors. Its isolated design makes it uniquely suited for in-channel detection in capillary electrophoresis systems. The system is powered by a standard lithium 9V battery and uses Smart Bluetooth® telemetry to a USB dongle for reliable data transfer. The potentiostat is fully supported by Pinnacle's Sirenia® software suite.

Product	Kit #
Handheld Isolated Potentiostat	9000-K7*

KEY FEATURES

- Portable
- Sample rate: 13 Hz
- Bias range: 0 - 4 V
- Resolution: 24 bits
- Bluetooth® transmission
- Transmission range: 7 m
- Current range: 80 uA
- Battery life: ~100 hrs (continuous use)

ANALOG ADAPTER

Analog adapters are excellent solutions for researchers who have existing amplification/acquisition systems but require the noise reduction provided by Pinnacle's headmounted preamplifiers and commutators. The adapters can be used to connect Pinnacle mouse and rat preamplifiers with third-party data collection systems.

Product	Kit #
3-Channel Analog Adapter	8242-K*
4-Channel Analog Adapter	8442-K*

COMMUTATOR

Pinnacle's mouse commutators are ideal for use in studies that require a low-torque electrical swivel. The lightweight nature of our commutators provides a platform for transferring electrical signals without significantly altering the behavior of the animal. Custom adapters can be ordered for integration into existing third-party cabling/connection schemes. Available for mice only.

Product	Item #
Six-pin commutator	8204
Ten-pin commutator	8408

MASTER CLOCK

The master clock is a central timing source for very long-term experiments that require high-precision synchronization of multiple devices. The unit connects directly to other devices via three TTL ports and communicates with data acquisition software using a USB cable. Because it eliminates latency, the master clock is perfect for optogenetics and behavioral studies.

Product	Kit #
Master Clock	9000-K8*

* Cables, software, and manuals are included in all kits.

LEARN MORE

Pinnacle's products are used daily to advance research at academic institutions, research hospitals, contract research organizations, and pharmaceutical companies across the world. Learn more about how current customers are using our products by visiting the Info Center on our website at www.pinnaclet.com/info-center.html.

PUBLICATIONS

Many Pinnacle customers regularly publish their scientific work in peer-reviewed journals. This space is dedicated to sharing our customers' research with other users of Pinnacle products and systems.

POSTERS

Missed a conference? Visit us online to review recent posters presented by Pinnacle and our customers at Neuroscience, AES, Sleep, and other major conferences.

LINKEDIN FORUM

Sign up for our LinkedIn group in order to network and share information with other scientists, researchers, technicians, and executives who are shaping the biomedical research field.

CONFERENCES

Pinnacle Technology regularly attends scientific conferences and meetings hosted both in the United States and internationally. Please stop by our booth at upcoming conferences to chat with a representative about how our cutting-edge tools can improve and simplify your research. Visit our website at ***www.pinnaclet.com/conferences.html*** for a complete list of events.

DISTRIBUTORS

Pinnacle Technology is proud to make our products available to an international customer base by teaming with a growing list of distributors from across the globe. Visit our website at www.pinnaclet.com/distributors.html for an updated list.

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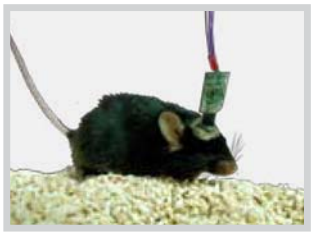

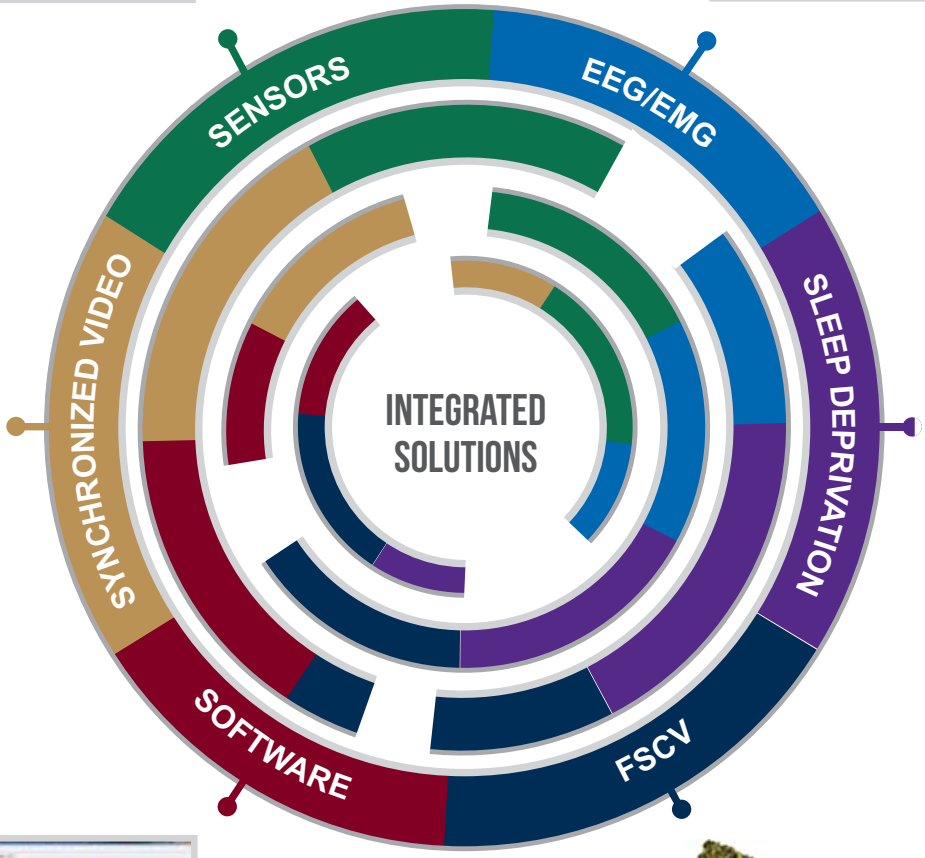

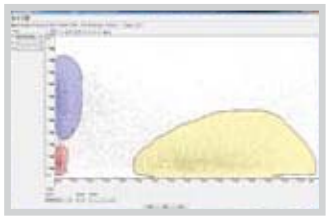

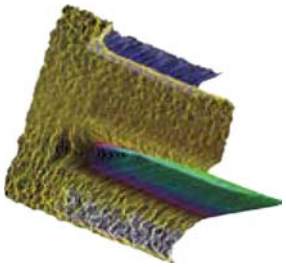

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