SEC-03M

SEC-03M - Single Electrode Voltage and Current Clamp Amplifier Module

Best suited to measure coupled cells
DUAL-SEC
TRIPLE-SEC

The combination with **PEN-03M** and **HVC-03M** modules forms a versatile system capable of

- Recording with sharp microelectrodes
- Recording with patch pipettes in whole-cell or perforated patch configuration
- Single electrode recording (CC and VC) independently from two cells
- Two electrode recording (CC and VC) from one cell
- Ultra-fast Iontophoresis

Please click lower image on the right to enlarge.

The SEC is also available in as **19" rackmount instrument**.

SEC-03M


Modular Dual Cell Single or Double Electrode Recording System

About SEC-03M

The SEC-03M is a switched mode single electrode voltage and current clamp amplifier module for recordings with sharp microelectrodes or suction (patch) pipettes.

Now it is possible to combine up to three SEC amplifiers in one 19 inch housing for investigating coupled cells and, if using npi's software CellWorks, no BNC cabling is required. All signals are linked internally to the INT-20M breakout box via the EPMS bus. Or combine an SEC-03M with a **PEN-03M** module for easy cell penetration or with a **HVC-03M** module to get a single and a two-electrode voltage-clamp system in one EPMS-housing.

SEC amplifiers are also available as **19" stand-alone devices.**

Ordering

Part No.	Description
SEC-03M	SEC-03M System for EPMS
SEC-HS	SEC-HS Standard Headstage
SEC-HSD	SEC-HSD Headstage with differential input

SEC-HSP	SEC-HSP Low-noise Headstage
SEC-MINI-SE	SEC-MINI Headstage standard cable 2,5m, D=2.3mm, 12x10mm w/ Housing
SEC-MINI-C	Standard Cable Extension (max. 6m)
SEC-MINI-SC	Special Cable for MINI-Headstage, high flexibility, 6-11 lines, 2.5m
SEC-MINI-SCE	Special Cable Extension for MINI-Headstage, high flexibility, 6-11 lines, max. 6m
SEC-EH	Standard Micro-/Patch Electrode Holder
SEC-EH-SET	Electrode Holder Set for SEC Amplifiers
SEC-MODA	Cell Model w/ Active Memb.Res.
SEC-MOD	SEC Cell Model Circuit
SEC-MOD-D	Dual SEC Cell Model Circuit
SEC-CON	SMB Cable for SEC Headstage

Technical Data

MODES OF OPERATION:
VC: Voltage Clamp mode (discontinuous)
CC: Current Clamp mode (discontinuous)
OFF: Current- and Voltage Clamp disabled
BR: Bridge Mode (continuous CC)
EXT: External control mode
MODE selection: toggle switch, LED indicators

HEADSTAGES:
Standard headstage
Operation voltage: ±15 V
Input resistance: $<10^{13}$ Ω (internally adjustable)
Current range (continuous mode): 120 nA into 100 MΩ
CC control: Coarse control for input capacity compensation
Electrode connector: gold plated SUBCLIC (SMB) with driven shield
Driven shield output: 2.3 mm connector, range ±15 V, impedance 250 Ω
Ground: 2.3 mm connector or headstage enclosure
Holding bar: diameter 8 mm, length 150 mm
Size: 100x40x25 mm
Headstage enclosure is connected to ground

Low noise (whole-cell) headstage (SEC-HSP)
Operation voltage: ±15 V
Input resistance: $<10^{13}$ Ω (internally adjustable)
Current range (continuous mode): 12 nA into 100 MΩ
external CC control: Coarse control for input capacity compensation
Electrode connector: BNC connector with driven shield
Driven shield output: 1 mm connector, range ±15 V, impedance 250 Ω
Ground: 1 mm connector or headstage enclosure
Mounting plate: 60x50 mm with four 6 mm holes
Headstage enclosure is connected to ground

Differential input headstage (SEC-HSD)
Operation voltage: ±15 V
Input resistance: $<10^{13}$ Ω (internally adjustable)
CMR: >90 dB
Current range (continuous mode): 120 nA into 100 MΩ
CC control: Coarse control for input capacity compensation
Electrode connectors: two gold plated SUBCLIC (SMB) with driven shields
Driven shield output: 2.3 mm connector, range ±15 V, impedance 250 Ω
Ground: 2.3 mm connector or headstage enclosure
Holding bar: diameter 8 mm, length 100 mm
Size: 100x40x25 mm
Headstage enclosure is connected to ground

Headstage enclosure is connected to ground

ELECTRODE PARAMETER CONTROLS:
Offset: ten-turn control, ±200 mV
Capacity compensation: range 0-30 pF
adapts compensation circuit to electrode parameters
coarse control at headstage
fine control at front panel: ten-turn potentiometer

BANDWIDTH and SPEED OF RESPONSE:
Full power bandwidth (REL = 0): >100 kHz
Rise time (10-90%, REL = 100 MΩ): <30 µs
Rise time (10-90%, REL = 5 MΩ): <8 µs
Electrode artifact decay
(switched modes, 10 nA signal): <1 µs (REL = 5 MΩ); <1.5 µs (REL = 100 MΩ) CAPACITY COMPENSATION tuned with no overshoot.

ELECTRODE RESISTANCE TEST:
obtained by application of square current pulses ±1 nA; 10 mV/MΩ; display XXX MΩ

CELL PENETRATION:
Overcompensation of capacity compensation, fixed timed

SWITCHED MODES PARAMETERS:
Switching frequency: linear control, 2-40 kHz; duty cycle: fixed to ¼ (25% current injection)

CURRENT RANGE in SWITCHED MODE:
Standard headstage: ±30 nA
SEC-HSP headstage: ±3 nA

SWITCHED MODE OUTPUTS:
Electrode potential: max. ±12 V, output impedance: 250 Ω
Switching frequency: TTL, output impedance: 250 Ω

CURRENT OUTPUT:
10 nA / V; output impedance: 250 Ω; current display: X.XX nA

POTENTIAL OUPUT:
Sensitivity: x10 mV; output impedance: 250 Ω; potential display: XXX mV

CURRENT CLAMP:
Input: 1 nA/V; input resistance: >100 kΩ
HOLD: X.XX nA, ten-turn digital control with -/0/+ switch, max. 10 nA
BRIDGE balance : XXX MΩ with ten-turn digital control
Noise (BRIDGE MODE): 400 µVpp / pApp with 100 MΩ resistance at 10 kHz bw

VOLTAGE CLAMP:
Input: /10 mV; input resistance >100 kΩ
HOLD: XXX mV, ten-turn digital control with +/0/- switch, max. 1000 mV
GAIN: 100 nA/V - 10 µA/V ten-turn linear control
Noise: potential output: <400 µVpp, current output: <400 pApp.

SPEED of RESPONSE (VC Mode):
1 % settling time: <80 µs for 10 mV step and <800 µs for 50 mV step applied to a cell model
(REL = 100 MΩ, Rm = 50 MΩ, Cm = 470 pF, switching frequency = 30 kHz, standard headstage)

DIMENSIONS:
24 HP (121.5 mm) x 3U (128.5 mm) x 7 inch (175 mm) deep

Downloads

Manual:
SEC-03M Manual

Brochures:

SEC-03M Brochure

SEC-03M System Brochure

References:

SEC Reference List