The **OC-725C Oocyte Clamp** is designed for two-electrode, whole-cell voltage clamping of *Xenopus* oocytes. The dedicated design of the OC-725C includes such features as high compliance voltage (±180 V) and unique bath clamp circuitry. These same features also make the OC-725C ideal for clamping other large cells and cell structures such as squid axons. Improvements to this version include an extended current measuring range, decreased noise level and a 4-pole Bessel filter.

**Fast Stable Voltage Clamping**

The OC-725C combines high AC and DC gains and a voltage compliance of ±180 volts to insure fast, nonsaturating clamp performance under nearly any condition. The AC clamp gain is variable up to 2000. An additional DC gain of 1 x 10^6 may be employed for high conductance cells (leaky oocytes).

Two clamp speeds are available: The Slow mode is used for screening oocytes or for applications not requiring fast response times. The Fast mode is used for accurate voltage clamp of fast whole cell currents. Clamp response time in the Fast mode is 350 µsec (10-90% rise time) when applying a 100 mV step to a model cell.

**Improved Bath Clamp Headstage**

The current measuring range of the OC-725C bath clamp headstage has been extended at both ends by the addition of a 3 position range multiplier. Smaller currents are amplified to usable levels and larger currents up to 1 mA can be recorded without output saturation. The unique design of the bath clamp eliminates the need for series resistance compensation. It provides an accurate measurement of bath current by creating a virtual ground in the bath while simultaneously clamping the bath potential at zero.

**Voltage Headstage Probe**

The voltage measuring headstage is a single-ended, high-impedance probe. Its small size, convenient mounting rod and 2 meter cable make for easy attachment to a micropositioner. The headstage input is a 2 mm diameter pin. An electrode holder with a 2 mm jack (supplied) mounts directly on the headstage.

**Voltage & Current Meters**

Independent meters provide simultaneous displays of membrane voltage $V_m$ and membrane current $I_m$. To assure proper impalement of the current electrode, the current meter displays membrane potential $V_e$ from the current electrode before the clamp circuit is turned on.

**Clamp Commands**

The internal Hold control is a digital push button control with two ranges; ±1 to 99 mV (x1) and ±2 to 198 mV (x2). Hold can be incremented in steps of 1, 2, 10 and 20 mV for I-V studies. External command signals applied to Command IN ÷10 are attenuated to reduce noise from the command source. Hold and external commands are summed.

**Additional Features**

- Buzz controls (1 kHz square wave) for each electrode aid in penetration of cell membranes with a minimum of leakage.
- Overload alarm (audible and visual) indicate when the compliance voltage is exceeded safeguarding the oocyte and indicating that current records are subject to saturation.
- DC Offsets for both voltage and current electrodes.
- Electrode Test for both electrodes.
- Capacity Compensation for the $V_m$ voltage input.

**Electrode Holders**

Two vented electrode holders with silver wires are typically required with the clamp; a straight type for use with the voltage headstage and a 45° type with mounting handle for use with current electrodes. Vents have been added to the electrodes to prevent pressure build-up inside the electrode which can damage oocytes. A two meter length cable assembly is provided to connect the current electrode holder to the clamp.
OC-725C
Oocyte Clamp (continued)

Dual Oocyte Studies
Some studies, such as voltage control across gap junctions, require the clamping of two oocytes in a common bath using two voltage clamps. The combined currents from the two oocytes cause problems since the bath clamp headstage cannot separate the individual currents and therefore cannot provide effective clamping.

OC-725C has two features to address these problems:
- An internal switch permits measurements of the current in series with the current electrode instead of in the bath.
- Optional differential voltage headstages (7255 DI): The differential measurement subtracts the voltage drop across the series resistance in the bath, which is normally eliminated by the bath clamp.

Specifications

Test Conditions
1. Model cell used to obtain specifications: model membrane, 1 MΩ in parallel with 220 nF, 1 MΩ current and voltage electrodes.
2. Noise measurements made with an 8-pole Bessel filter.

Voltage Recording Channel (Vm):
- V Probe Input Impedance 0.5 x 10^12 Ω, 1 pF
- Output Resistance 100 Ω
- DC Offset ±200 mV at input, var. from zero with 10 turn control, (20 mV/turn)
- Noise (0-10 kHz) 3 µV RMS with input grounded 20 µV RMS with model cell
- Electrode Test 10 mV/MΩ read on meter 100 mV/MΩ at Ve x10 output, rear panel
- Meter Range ±199.9 mV full scale
- Capacity Compensation 0 - 90 pF

Current Sensing (Bath Clamp) Channel (Im):
- Noise (0-1 kHz) 4.5 nA RMS with bath clamp 10 nA RMS in output leg
- I Monitor Output 1 nA/mV to 1 mA/10V in 7 steps and 3 ranges, x0.1, x1, and x10
- Gain Telegraph Output 0.2 to 2.6 V in 7 steps (200 mV/step) and 3 ranges, x0.1, x1, and x10. Compatible with data acquisition software
- Meter Range, Full Scale Clamp Current: ±199.9 µA

Order # Model Product
W4 64-0028 OC-725C Oocyte Clamp supplied with 7250V Voltage Headstage, 7251I Bath Clamp Headstage, 7259C Current Cable, Model Membrane and Rack Mount Hardware. Specify line operating voltage if other than 100-130 VAC. One straight holder and one 45° holder purchased separately.

Optional/Replacement Headstages
W4 64-0030 7255DI Optional Differential Headstage
W4 64-0031 7250V Replacement Voltage Headstage
W4 64-0032 7251I Replacement Bath Clamp Headstage
W4 64-0033 7259C Replacement Current Electrode Cable
W4 64-0029 725MC Model Cell

For Use with OC-725C Voltage Probe
W4 64-1008 ESW-F12V Straight Holder 1.2 mm glass OD
W4 64-1009 ESW-F15V Straight Holder 1.5 mm glass OD
W4 64-1010 ESW-F20V Straight Holder 2.0 mm glass OD
W4 64-1007 ESW-F10V Straight Holder 1.0 mm glass OD

For Use with OC-725C Current Electrode
W4 64-1051 E45W-F10VH 45° Style Holder 1.0 mm glass OD
W4 64-1052 E45W-F12VH 45° Style Holder 1.2 mm glass OD
W4 64-1053 E45W-F15VH 45° Style Holder 1.5 mm glass OD
W4 64-1054 E45W-F20VH 45° Style Holder 2.0 mm glass OD

voltage clamps