



New Feature

NEW: NOW AVAILABLE IN THERMALLY STABLE STAINLESS STEEL

**THREE INDEPENDENT AXES –
25mm ORTHOGONAL TRAVEL IN X, Y AND Z**

SUB-MICRON (LESS THAN 100nm) RESOLUTION

USER SELECTABLE ANGLE FROM 0-90 DEGREES VIA ROE INPUT

MECHANICALLY ROBUST CONSTRUCTION FOR HIGH STABILITY

DISPLAY INDICATES COORDINATES IN RELATIVE OR ABSOLUTE

**COMPACT, FANLESS, USER-FRIENDLY, ROE CONTROLLER
PRESERVES BENCH AND RACK SPACE**

CARRIES UP TO A KILOGRAM

**PUSH BUTTON CONTROL OF MULTIPLE FUNCTIONS –
WORK, HOME, LOCK, PULSE AND RELATIVE**



TRIO-245 shown with Sutter IPA® headstage (not included)

TRIO™ MICROMANIPULATOR SYSTEM

The new **TRIO™-245** from Sutter Instrument is a highly stable 3-axis manipulator, with 25mm of travel on each axis. The TRIO's synthetic 4th-axis can be set in software at any angle between 0 and 90 degrees for diagonal movement. Based on a lead-screw design with a smaller overall size and footprint than most manipulators, the TRIO-245 is ideal for applications that require 2 pipettes in one setup, or for setups where space is limited.

Sutter pioneered the use of linear drives for low noise patch clamp recording. Our next-generation TRIO manipulators use a combination of state-of-the-art software and mechanical design that eliminates the need for the motor to remain powered on during recording, thus eliminating the heating effects of the motors and giving us the quietest manipulators in the industry. This inherent stability ensures that Sutter manipulators are ready to work when you are – saving you valuable hours of research time.

The compact design of the integrated Rotary Optical Encoder (ROE) controller requires minimal bench space; provides quiet, fan-free operation; and is easy to use. No rack mounted controller is required. Position coordinates, in relative or absolute values, are displayed directly on the ROE. The TRIO manipulators use a logarithmic acceleration algorithm

that eliminates the need for speed selection. As the knobs on the ROE are turned faster, acceleration ramps up. This allows for smooth and intuitive motion control of electrode position without the need to stop and change speeds, or lift your hand from the knobs. A Y-axis lockout function (accessible by DIP switch) is also available, allowing X/Z-only axial movement during Home and Work repositioning.

An alternate configuration, the TRIO-235, removes the Z axis, and replaces it with an adjustable diagonal axis. This configuration provides a traditional X and Y axis, with a diagonal axis that can be adjusted in angle with a set screw. On this model, we have added software to create a synthetic "Z-axis" by combining the diagonal and X-axes, in reverse of how we create a synthetic diagonal axis on our other manipulators. The diagonal features 50mm of travel, with X and Y axes that have 25mm of travel. The TRIO-235 and TRIO-245 both feature the same precision bearing and lead-screw design.

Five conveniently located buttons control all the functions you will need in normal operation. Press and hold the WORK button to quickly store a work position; pressing WORK after this will return the manipulator to the same location. Home sends the manipulator to a second position, often set for a

point furthest from the microscope, which is useful for rapid pipette exchange. Press Work and Home simultaneously to easily set or modify the 4th-axis angle. When you are ready to begin recording data, the motor drive electronics can be put in a super-quiet mode by pressing Lock. Display coordinates can toggle between relative and absolute by pressing the Relative button; holding the button down will zero the relative coordinates. Finally, Pulse activates a pulse movement mode that produces small, rapid bursts of motion that can be advantageous for cell penetration with sharp electrodes.

ADDITIONAL FEATURES

- Suited for *in vivo* and *in vitro* electrophysiological recording
- Universal mounting system for headstage or pipette holder
- DIP switches on ROE select direction of movement produced by turn of ROE knob
- USB interface for computer control
- Fast movement with a top speed of 3mm/sec. (while homing)

- TRIO-235** 3-axis manipulator (x, y and diagonal)
- TRIO-245-L** 3-axis manipulator (x, y and z) - left-handed setup
- TRIO-245-R** 3-axis manipulator (x, y and z) - right-handed setup



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