



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

SOFTWARE-BASED DIAGONAL AXIS IN ANY USER SELECTABLE ANGLE (0 - 90 DEGREES)

SUB-MICRON (LESS THAN 100 nm) RESOLUTION

FAST MOVEMENT WITH A TOP SPEED OF 3 mm/sec (WHILE HOMING)

MECHANICALLY ROBUST CONSTRUCTION FOR HIGH STABILITY

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

CARRIES UP TO A KILOGRAM

MULTIPLE PUSH BUTTON FUNCTIONS – WORK, HOME, LOCK, PULSE, RELATIVE, SPEED & ANGLE

SUITED FOR *IN VIVO* AND *IN VITRO* ELECTROPHYSIOLOGICAL RECORDING



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



TRIO™-245 THREE-AXIS MICROMANIPULATOR SYSTEM

The **TRIO™-245** from Sutter Instrument is a highly stable 3-axis manipulator with 25 mm of travel on each axis. The **TRIO**'s synthetic 4th axis can be set in software as 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 setups where space is limited.

The **TRIO-245** controller employs 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 electrically quietest manipulators in the industry. This stability ensures that Sutter manipulators will not drift in the middle of experiments.

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.

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. Pressing [SPEED] allows the selection of one of 4 speed ranges. With practice, there is no need to ever change speeds, however, we have included three low speed ranges for those who work at very high magnification. Holding [SPEED] for three-seconds will lock the knobs out, to prevent accidental movement. 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. Hold [PULSE] for three-seconds to set or modify the 4th axis angle between 0 and 90 degrees.

Designed with maximum flexibility in mind, a DIP switch on the controller changes the directional movement of the ROE knobs to accommodate the preference of the user. The **TRIO** comes standard with a universal mounting system suitable for the most popular headstages or pipette holders.

- TRIO™-245 BASIC SYSTEM**
Includes the manipulator, controller, rod holder, 4 inch dovetail extension, mounting adapter plate, Z-axis vertical extension, cables, and power supply
- 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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