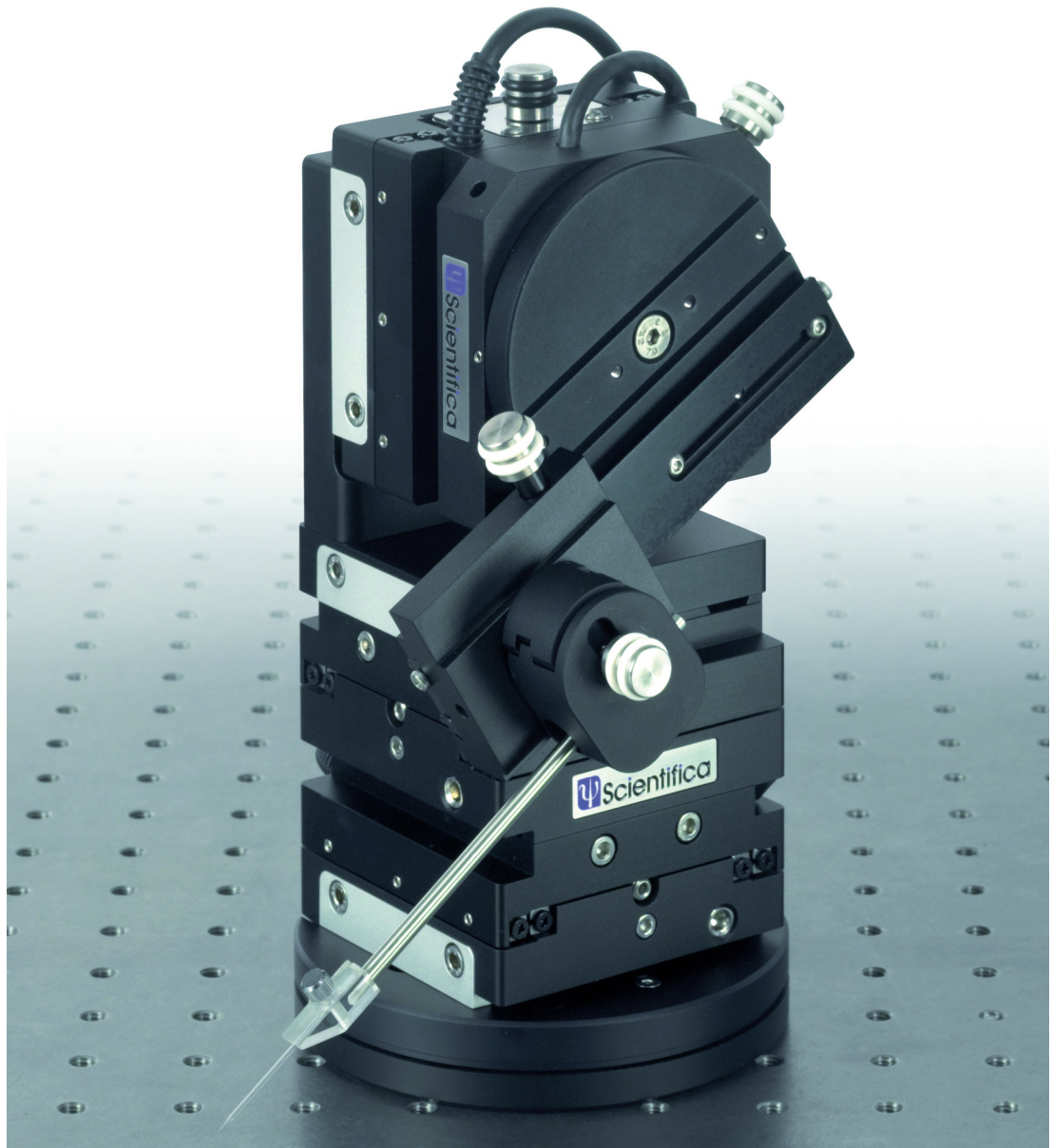




 **Scientifica**

Experts in Electrophysiology

# PatchStar Micromanipulator



*Control*  
*Productivity through control*

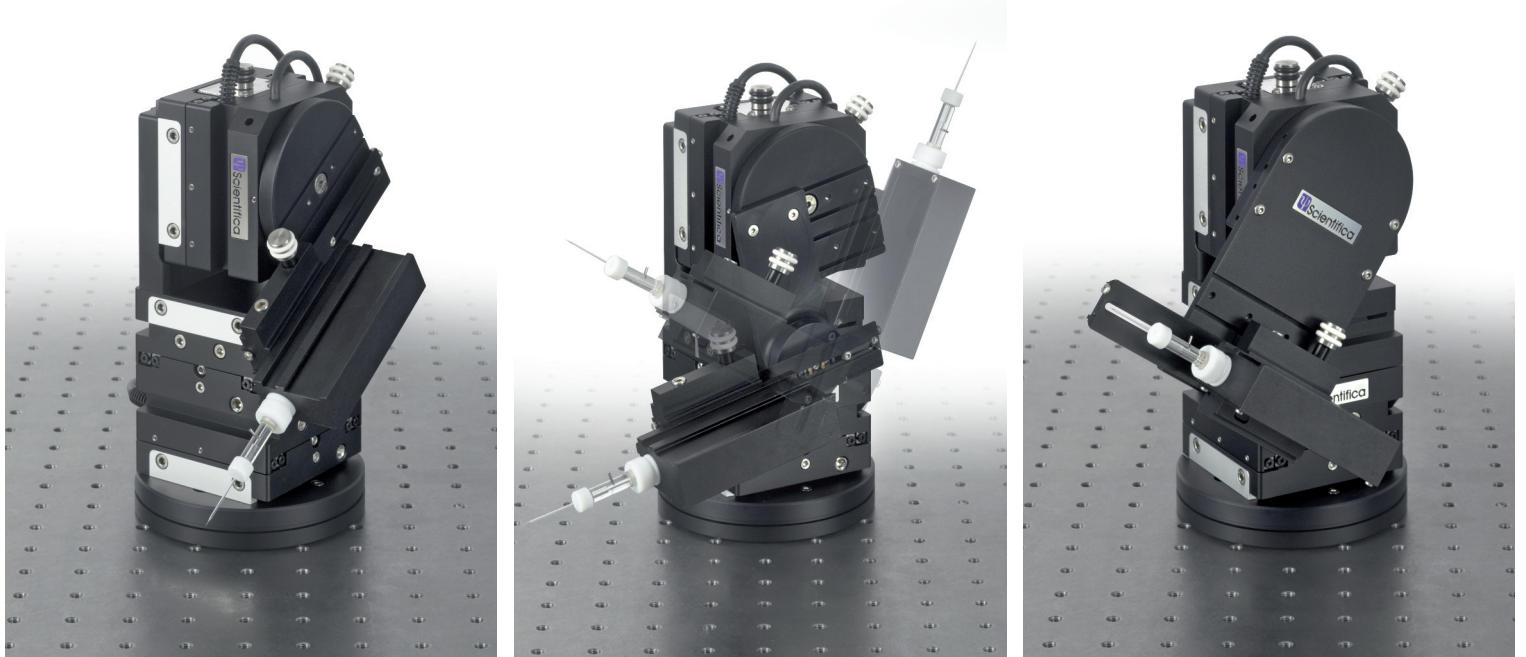
# PatchStar

The PatchStar motorised micromanipulator was developed in collaboration with our electrophysiology customers to create a stable, versatile, low-noise yet affordable micromanipulator.

The PatchStar has been designed to be versatile to suit all applications and this micromanipulator is now widely used throughout the world for a whole range of experimental techniques including; Patch Clamping, Sharp Electrode Recording, Microinjection, Stretch Testing and other procedures requiring delicate and long term positioning.

The high quality materials and assembly along with the super smooth motion and long term stability have proven that the PatchStar offers the best choice for even the most demanding applications.

*Standard PatchStar with Axon headstage shown with optional flip-up bracket and shallow bracket allowing easy & rapid probe exchange*



The PatchStar offers 4 axes of motorised motion, X Y Z and 'Approach'. This micromanipulator can be easily mounted next to both upright and inverted microscopes (*see the Scientifica range of mounting options*) and suits many experimental types.

Low noise means that small signals may be detected, stability allows work with small cells and long experiments to be performed. The super smooth motion allows for probe positioning onto delicate cells and the fast pipette exchange system saves you time.

In addition, many control options including simple programming ensure that the PatchStar is a reliable, versatile and easy-to-use system.

# PatchStar Micromanipulator

# Features

- **Ultra stable** - less than 1 micron drift in 2 hours allows long term experiments
- **Low noise electronics** - suitable for single channel recordings
- **Super smooth motion** - 20nm resolution and quality engineering means you can reliably position your electrode or probe on the cell of choice
- **Choice of controls** - Control Cube, Joystick, PatchPad or software controlled
- **Four axes of motion** - maximum positioning versatility
- **Easy pipette exchange** - increased productivity and reproducible positioning
- **Auto angle detection** - pipette axis motion for accurate sub-surface positioning
- **Modular design** - easily configured for left or right-handed operation
- **Choice of accessories** - customise your PatchStar to suit your microscope set-up

# Stability

Long term experiments or those involving small cells require absolute stability. The PatchStar can boast less than one micron of drift in 2 hours! This data has been confirmed in real laboratory conditions. This is achieved by careful mechanical design, the use of high quality crossed-roller bearings, stable electronics and a high performance drive system. Small stepper motors drive leadscrews and captured nut mechanisms to offer resolution of 20nm. This also ensures stability and provides backlash-free smooth motion without lateral probe movements.

## Noise

With most electrophysiological recordings it is essential to have minimal electrical noise. The linear drive electronics we use means that the noise level is exceptionally low. You can confidently carry out single channel recordings without having to switch off the micromanipulator. Not only is the micromanipulator electrically quiet, we have made the system audibly quiet too!

## Flexible configurations

When you initially purchase your micromanipulator you may wish to position it on the right hand side of your sample. Later you may wish to switch it to the left side but unfortunately many other micromanipulators will not enable you to do this. The PatchStar has been designed using dovetail slides and can be switched from right to left handed within two minutes. This means that you can confidently choose the PatchStar and know it will fit with your future needs.

## Rapid pipette exchange

Many experiments require probe change between recordings. The PatchStar comes with a rotation and slider to make pipette exchange fast, simple and convenient. The adjustable stops mean that you can return to your working position to within a few microns, every time.

# Control Options

As all experiments and microscope systems are different, we offer a choice of control options for the PatchStar.

## Control Cube

This is the most popular of the control options. The weighted wheels connect to rotary optical encoders ensuring excellent 'hand-eye' motion control. The wheel tensions can even be altered to suit your preferred feel. The Control Cube provides several functions at your fingertips providing useful and powerful motion control.



**Approach on/off** This function converts the direction of movement from X or Z to the 'Approach Angle'. This approach angle is needed for penetrating slices without lateral motion causing cell or tissue damage. An encoder built into the manipulator detects the headstage angle and the speed and step size of the horizontal & vertical motors are adjusted automatically so that the probe or pipette approaches at an even angle. And it is all done in realtime in firmware so there is no need for fiddly dipswitches or programming.

**Speed setting** This function allows you to select at which speed the manipulator can move. And you have an almost infinite choice of speeds available in the LinLab software.

**Home In/Home out** These functions allow you to confidently retract and reinsert your probe into your sample. An offset function is available to prevent longer pipettes from crashing.

**Step** The step size can be configured to your requirements and is particularly useful to penetrate the membrane for making sharp electrode recordings.

**Memory positions** Allows you to set and recall up to 50 preset positions.

## PatchPad

The PatchPad offers all the same functionality and benefits as the Control Cube but is presented as a flat panel. It features a colour touchscreen and ergonomic design. It may be used with additional temperature control systems as well as other Scientifica micropositioning systems. This may suit your spatial needs or personal preferences. The choice is yours.



## Joystick

Some applications, including many microinjection requirements, are suited to the joystick option. Speed is controlled by the amount of deflection of the joystick. With the additional benefit of the high speed button the joystick offers easy positioning control. We have also implemented memory positions on the joystick panel allowing for return to pre-set positions. The aluminium base and comfortable joystick make for an ergonomic working position.

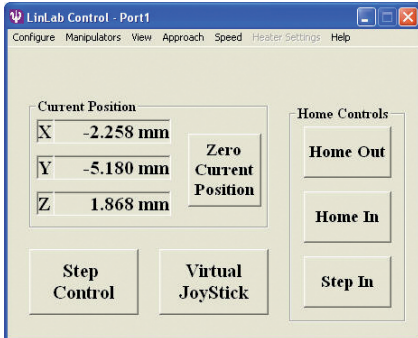


## Software

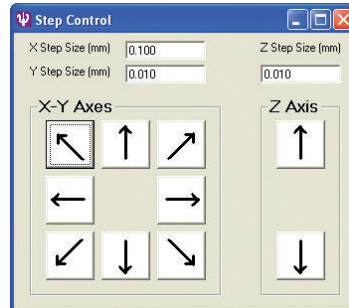
Every PatchStar is ready to use out of the box, but if you wish to customise your PatchStar, control it with a virtual joystick or program its movements then you will be pleased to know that every PatchStar comes with LinLab software.

LinLab is a Windows™ based program which gives you further control over the micromanipulator. You are able to view XYZ positions, control triggered step sizes, customise the speed settings, set home features and offsets and many more. The virtual joystick and preset step motions allow for even further options.

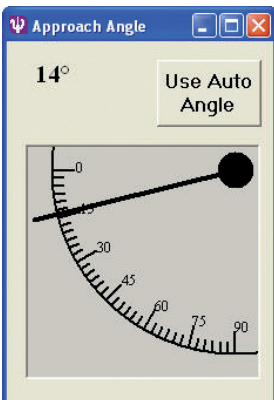
If you have a more unusual application where you would require full remote program control over your micromanipulator, then the "open" format provides easy access to integrate the PatchStar with your own software.



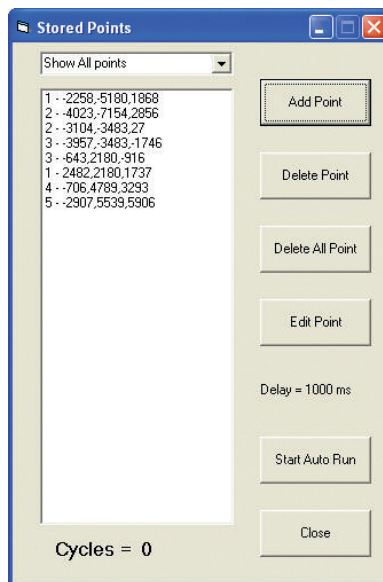
Main software control interface



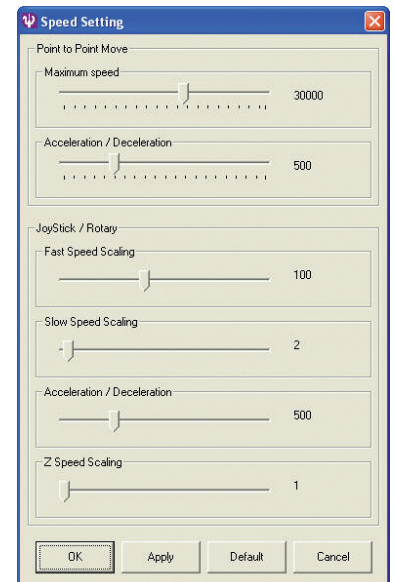
Virtual step control



Automatic detection of approach angle



Memory points library



Customised speed settings

# Accessories & Options

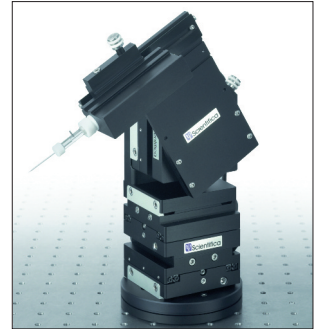
## Bracket options

For increased versatility, a number of bracket options are available to make the PatchStar even more convenient to configure and use with your microscope setup.



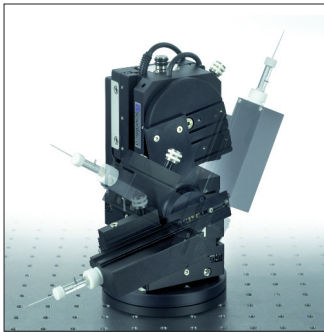
### **Shallow Bracket (left)**

This bracket is popular for researchers requiring a shallow angle of approach for the probe. Particularly useful when recording from tissue slices with upright microscopes.



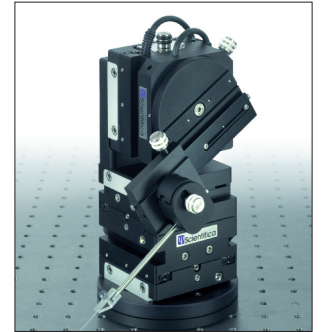
### **Steep Bracket (right)**

Similar to the shallow bracket, the steep bracket can be easily attached and increases its versatility.



### **Flip-up Bracket (left)**

Offering the same advantage as the shallow bracket, this bracket has the added benefit of being able to flip the probe vertically. This helps with probe exchange in space-limited areas.



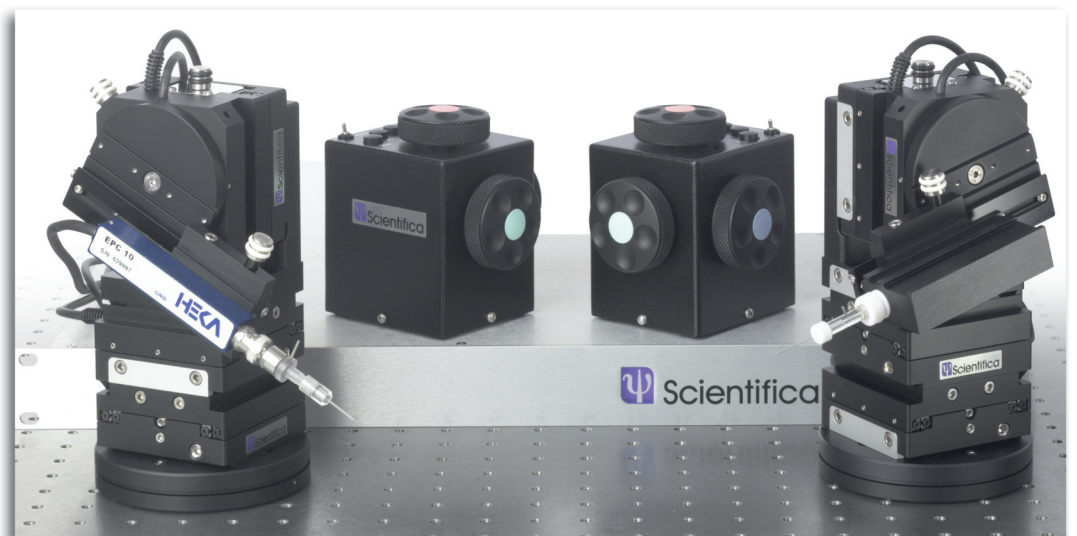
### **Probe Holder Bracket (right)**

An adjustable holder for mounting a range of bar-style mounts including headstages, pressure ejection systems, stimulators etc. The bracket allows the probe to be set at any angle.

## Double PatchStar Micromanipulator

The double PatchStar has all the benefits of a single PatchStar but has the added advantage of the ability to control two micromanipulators from one 1U rack-mountable enclosure. The double PatchStar is available with control from one or two Control Cubes as well as the PatchPad option.

And if your research demands control of more than two micromanipulators and perhaps other devices such as temperature control and perfusion, then Scientifica has developed the PatchPro system. This allows individual control of up to 12 devices from one 4U rack. Contact Scientifica or your local distributor for more details.



Double PatchStar system with two Control Cubes

# PatchStar Micromanipulator

# Technical Specifications

## **PS-7000C**

### **PatchStar Micromanipulator**

Motorised 3 Axis super smooth micromanipulator providing 20 mm of high resolution (20 nm) travel in XYZ and virtual approach. Drift of less than 1 micron over two hours. Ultralow electrical noise. Mounting components, rotation stages, sliding carriage for headstage. Control Cube with speed control switch, home in - home out function, memory and step functions. Manual control in XYZ and virtual approach axes. 19" rack mountable control unit with USB connection. LinLab software for set up, PC control and custom settings.

## **PS-7000J**

### **PatchStar Micromanipulator with Joystick**

As PS-7000C specifications except ergonomic Joystick with proportional speed control and hi-speed button replaces Control Cube.

## **PS-8300C**

### **Double PatchStar Micromanipulator System - One Control Cube**

Comprising two PatchStar micromanipulators. Includes one switchable Control Cube with all functions.

## **PS-8200C**

### **Double PatchStar Micromanipulator System - Two Control Cubes**

Comprising two PatchStar micromanipulators. Includes two Control Cubes with all functions.

## **PS-8500-PP**

### **Double Patchstar System with PatchPad**

Comprising two PatchStar micromanipulators. Includes one PatchPad with all functions.

## **PS-7550 Steep Bracket for PatchStar**

Allows steep angle positioning of headstage.

## **PS-7500 Shallow Bracket**

Allows low, shallow angle positioning of headstage, (recommended if mounting on SlicePlatform or Movable Top Plate).

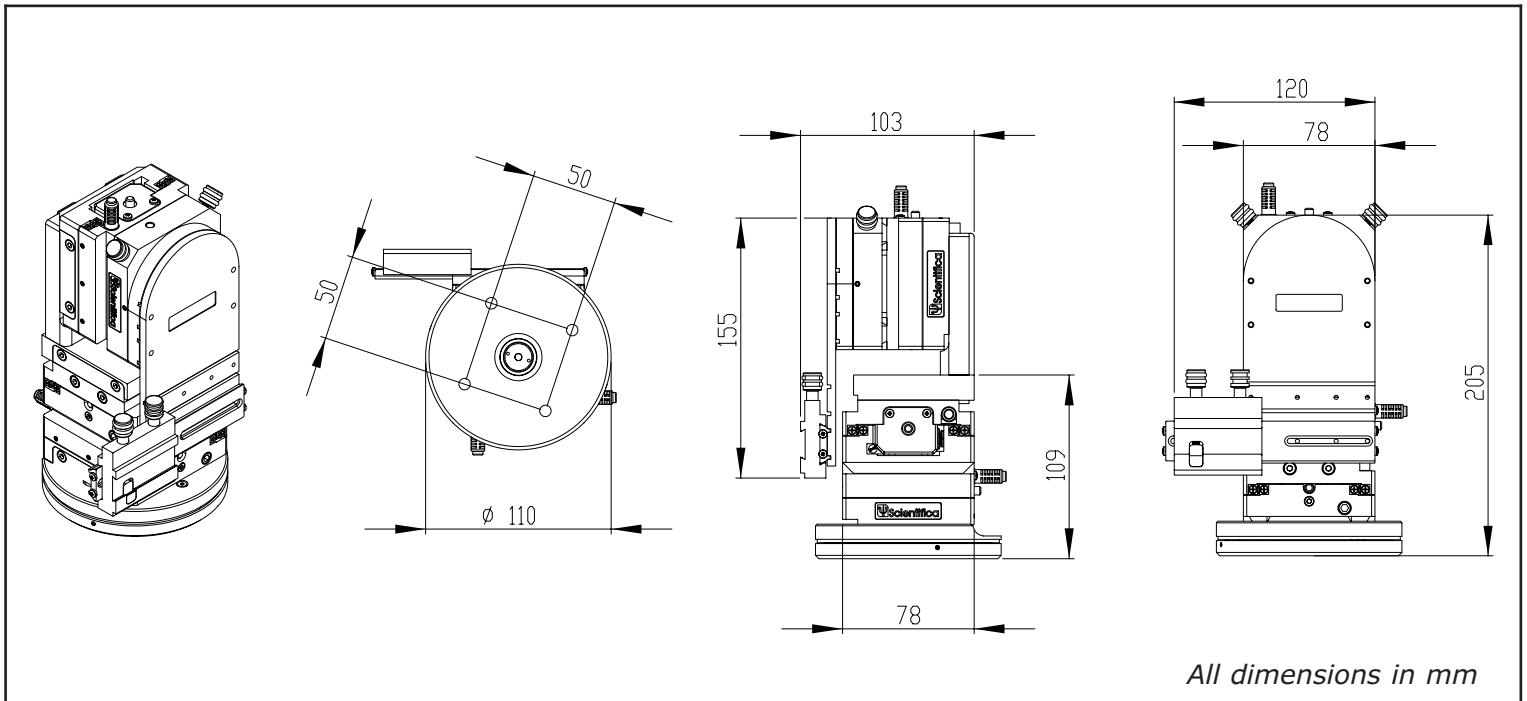
## **PS-7600 Universal Rod and Carriage Holder**

PatchStar rod holding bracket for mounting stimulation bars or headstages with mounting bar.

## **PS-7700 Flip-Up Vertical Pipette Exchange Bracket**

Mounts to PatchStar to allow vertical flip of probe. Convenient where space is limited.

# Dimensions



# Warranty

All Scientifica instruments are sold with a two year warranty to give you complete peace of mind. This covers all defects in manufacturing and materials, providing the system is registered with us within 30 days of delivery. An extended warranty can be purchased if desired after this two year period.

For more information or to order within the UK and Eire, please contact Scientifica directly. Outside these areas, please contact your local distributor or visit our website.

SCIENTIFICA LTD,  
Kingfisher Court, Brambleside,  
Bellbrook Industrial Estate,  
Uckfield, East Sussex TN22 1QQ  
United Kingdom

Tel: +44(0)1825 749933  
eMail: [info@scientifica.uk.com](mailto:info@scientifica.uk.com)  
Web: [www.scientifica.uk.com](http://www.scientifica.uk.com)

Your local distributor:

**Physio-Tech**  
株式会社 フィジオテック

〒101-0032 東京都千代田区岩本町 1-6-3  
(岩本町163ビル4F)  
TEL 03-3864-2781 FAX 03-3864-2787