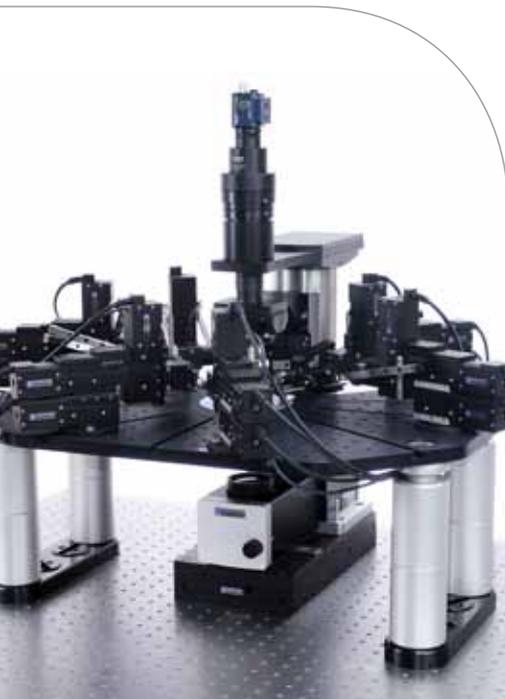


## MicroStar Micromanipulator

Slim profile - ideal for multi-manipulator setups

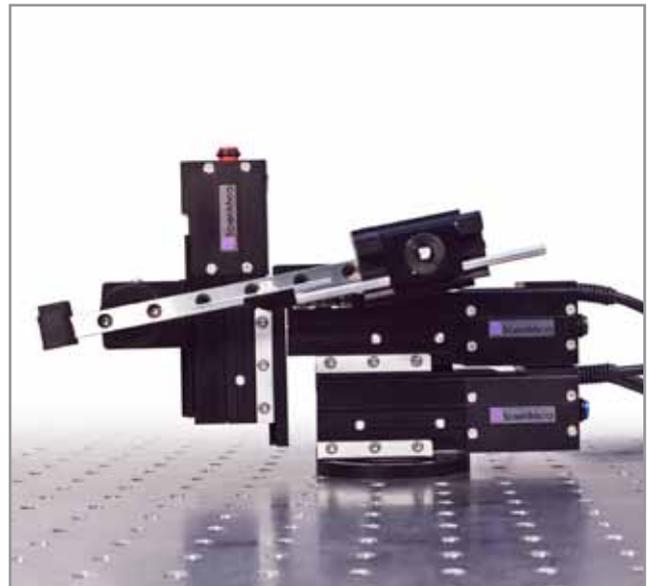


## MicroStar Micromanipulator

### Slim profile for flexible and stable electrode placement

The MicroStar has been developed to meet the requirements of researchers using multiple micromanipulators, or carrying out experiments when there are significant space constraints.

Including the stable motors and low-noise electronics developed for the world-renowned PatchStar, the MicroStar is a narrow, versatile and user-friendly solution for demanding electrophysiology applications.



#### Slim profile and small footprint

The MicroStar's carefully considered, slim profile and small footprint allows up to eight micromanipulators to be arranged around a sample.

The compact design is a valuable feature when studying network connectivity which requires placement of multiple electrodes, or in studies where space around the sample is limited by other equipment.

This greatly improves productivity and result yield; as well as broadening the range of experiments that can be carried out.

#### Stable and drift-free

The MicroStar has been engineered for low-drift operation (less than 1  $\mu\text{m}$  in 2 hours), making the MicroStar ideal for patching fine structures or long-duration experiments.

The crossed-roller bearings, and anti-backlash lead screws (used within the motors) guarantee consistent travel throughout the range of travel.

Headstages or probes can be mounted on the long sliding carriage, enabling fast and convenient pipette exchange without interference to other equipment. This also ensures that the new electrode can be returned exactly to its original position.

#### Smooth travel and fine movement control

The compact design of the MicroStar retains 20 mm of smooth, accurate travel in X and Z, and 14 mm in the Y axis.

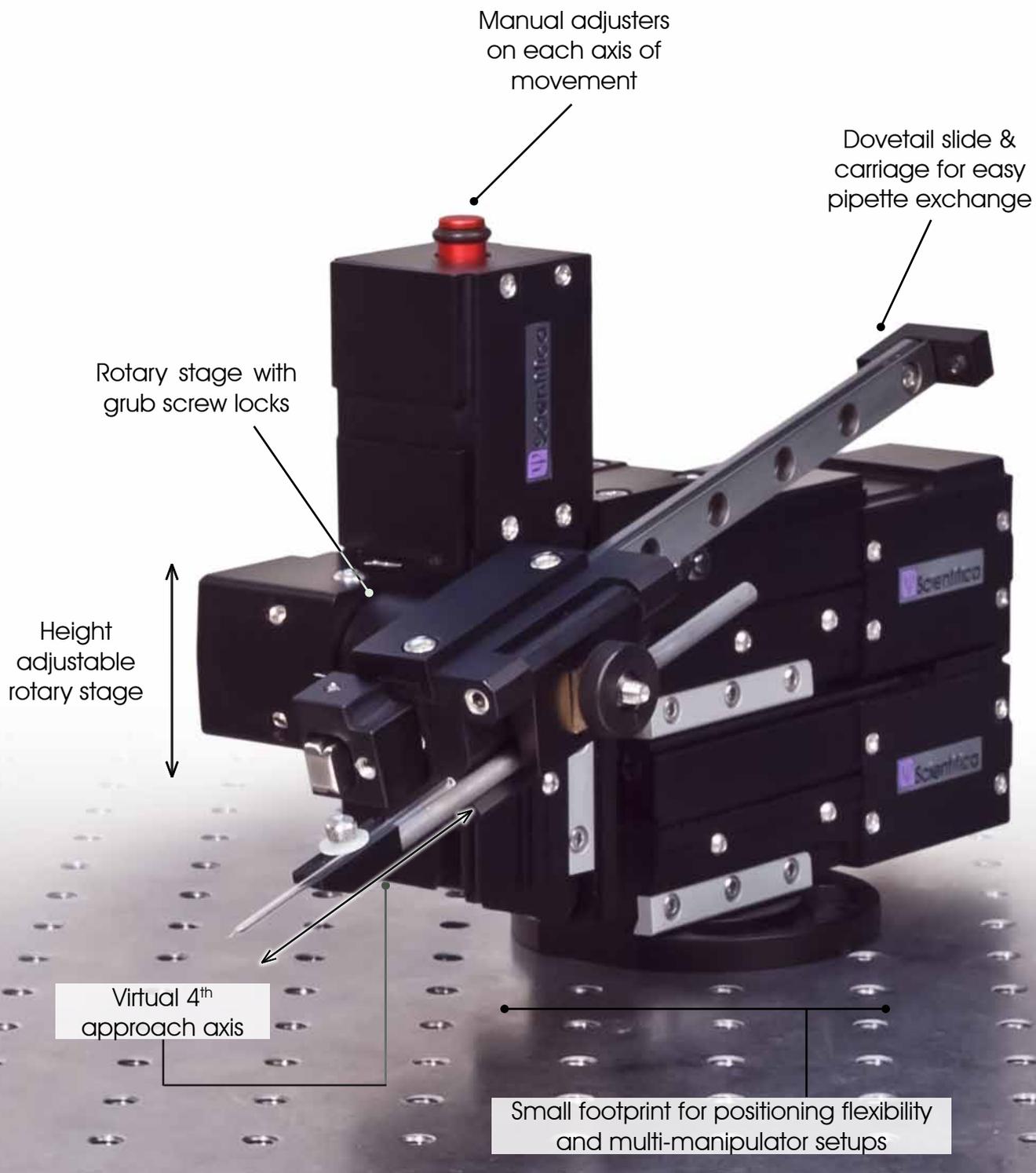
Utilising precise stepper motors with 20 nm resolution, each axis offers fine movement control for accurate electrode placement.

A fourth 'virtual axis' allows the user to approach the sample along the axis of the probe and features a unique 'Smart Sensor' which removes the need to manually measure, or set the angle.

#### Perfect integration

The MicroStar can be easily operated as part of a complete electrophysiology setup, neatly integrating with all other motorised devices from Scientifica, via the free LinLab software.

**LinLab** allows the user to customise and adapt their system to their exact needs, linking manipulators, microscope movement, and motorised stages to improve efficiency and ease of use.



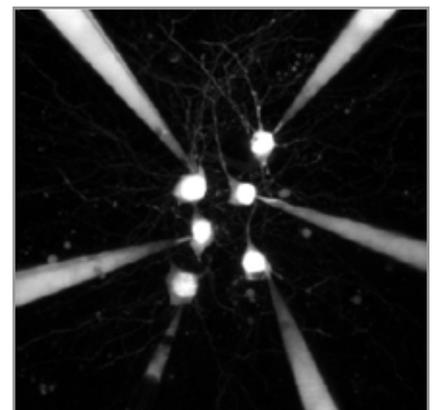
## Case study - Tom Mrsic-Flogel, UCL

The MicroStar was developed in close collaboration with leading neuroscientists, aiming to overcome the restrictions faced during studies of synaptic connectivity.

Dr Tom Mrsic-Flogel used MicroStars in his laboratory to study the complex interactions in the mouse visual cortex. The group recorded synchronously from **six patched cells**, allowing them to study the properties of individual neurons and their role within complex patterns of interactions. Ho Ko from the team described how the MicroStar increased their productivity:

*"Multiple patch clamp recording is a labour intensive task and one can only assess a small number of potential connections in each recording. The small size of the MicroStar manipulators allowed us to fit more manipulators around the rig, hence improving the yield of the experiments"*

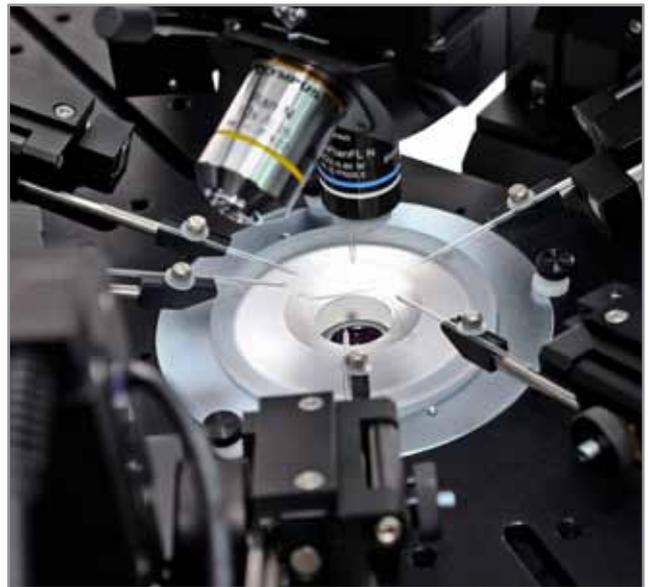
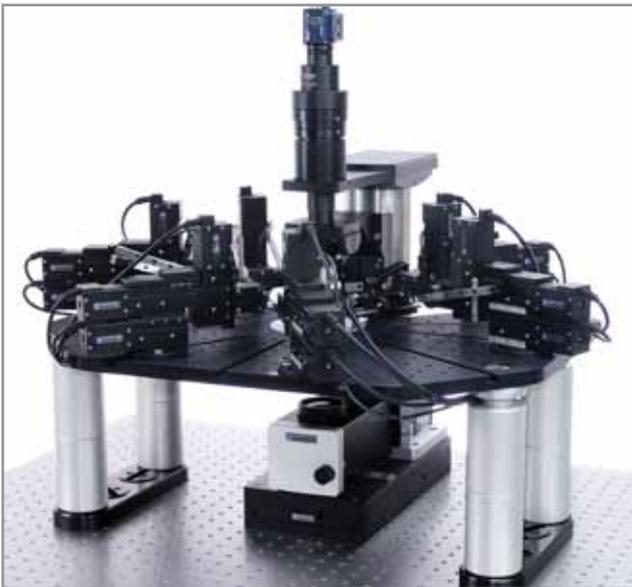
Ko, H., Hofer, S.B., Pichler, B., Buchanan, K.A., Sjöström, P.J., Mrsic-Flogel, T.D. Functional specificity of local synaptic connections in neocortical networks *Nature* 473,87–91(05 May 2011).



## MicroStar benefits

### Easy integration - multiple manipulator setups

Multi-micromanipulator setups from Scientifica provide a fully integrated and neat solution for complicated electrophysiology experiments.



#### Multiple MicroStar setups

To save money and space, up to two MicroStars can be controlled from a single control rack.

Each MicroStar can be specified with its own control device, or alternatively, one control device can be selected to alternate between the control of each manipulator.

#### Left to right-handed in minutes

Scientifica micromanipulators all feature a clever modular design, allowing users to quickly re-configure them between left and right-handed. This improves the manipulators flexibility and usefulness within the laboratory.

For the MicroStar, this conversion between left and right-handed can be done simply by inverting the rotary stage on the front of the unit.

The manipulator can then be relocated to the other side of the sample, with the dovetail slide still visible and accessible to the user.

#### Complete electrophysiology setups

Scientifica's dedicated team of product specialists can also help specify an entire rig of integrated equipment.

Micromanipulators, translation stages, through to temperature control (and even Scientifica's SliceScope motorised microscopy system) can all be efficiently multi-plexed into the same control system and PC interface.

#### PatchPro & SliceScope Pro Systems

For even greater return-on-investment the MicroStar can be purchased as part of Scientifica's SliceScope Pro or PatchPro packages.

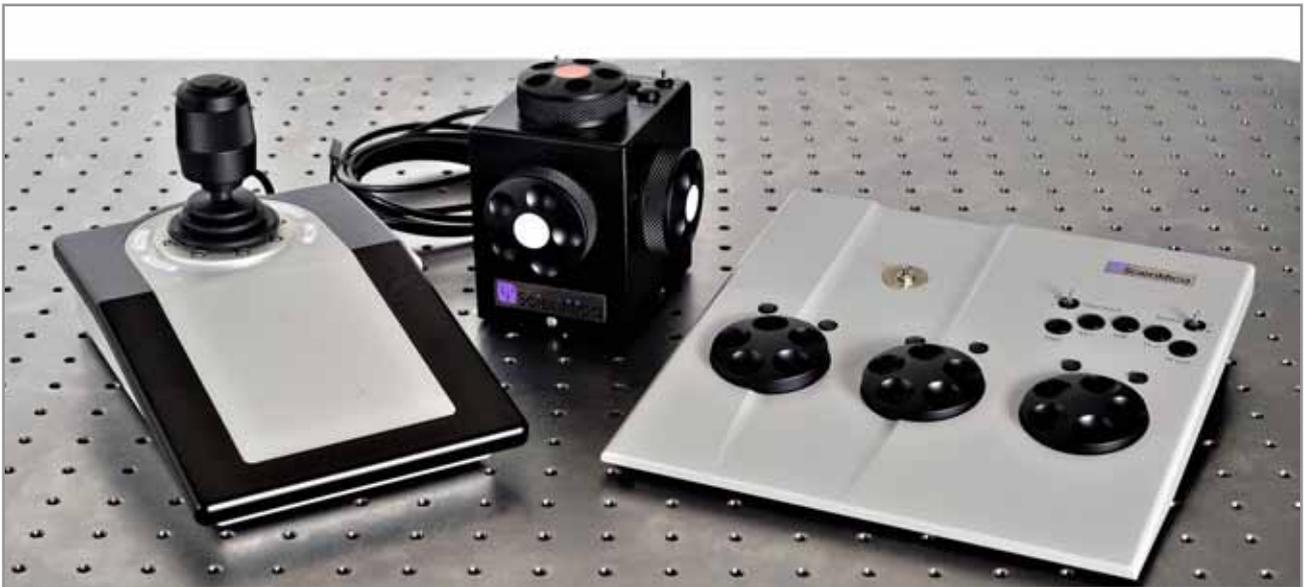
A SliceScope Pro system includes the slimline, ultra-stable SliceScope motorised microscope. Whilst PatchPro systems are compatible with upright or inverted microscopes from all major manufacturers.

These systems contain everything required to begin patch clamp and imaging studies, including two manipulators, a choice of mounting options and control devices. For more information, speak to a sales representative or visit the website.

## Control devices

Scientifica offer a choice of control devices that can be configured for use with the entire range of manipulators and translation stages.

LinLab software is provided free of charge with all motorised devices and offers the user further control and opportunity to customise their system.



### Control Cube

The Control Cube is a compact, wheeled design, with fingertip control. Each of the three wheels corresponds to an axis of movement and can be converted between left and right-handed operation.

It provides fast access to a variety of functions including activating the 'approach' axis, adjusting speed, setting and recalling memory positions and more.

### Joystick

The Joystick offers intuitive directional control in all three axes with movement speed proportional to the amount of deflection applied.

### Follow Function

The unique '**Follow Function**' within **LinLab** is an excellent example of how motorised devices can be integrated together allowing the user to virtually link manipulators and stages to keep pipettes in the field of view, whilst searching for areas of interest.

This overcomes the common problem of searching a large sample for an area of interest then having to bring pipettes into the field of view.

Once a cell of interest has been located, the recording, or stimulating electrode, can be simply "released" from follow control and the cell approached as normal.

### PatchPad

The PatchPad is a flat panel design also with three wheels, each allocated to an axis of movement. It includes the same easy access buttons and switches as the Control Cube.

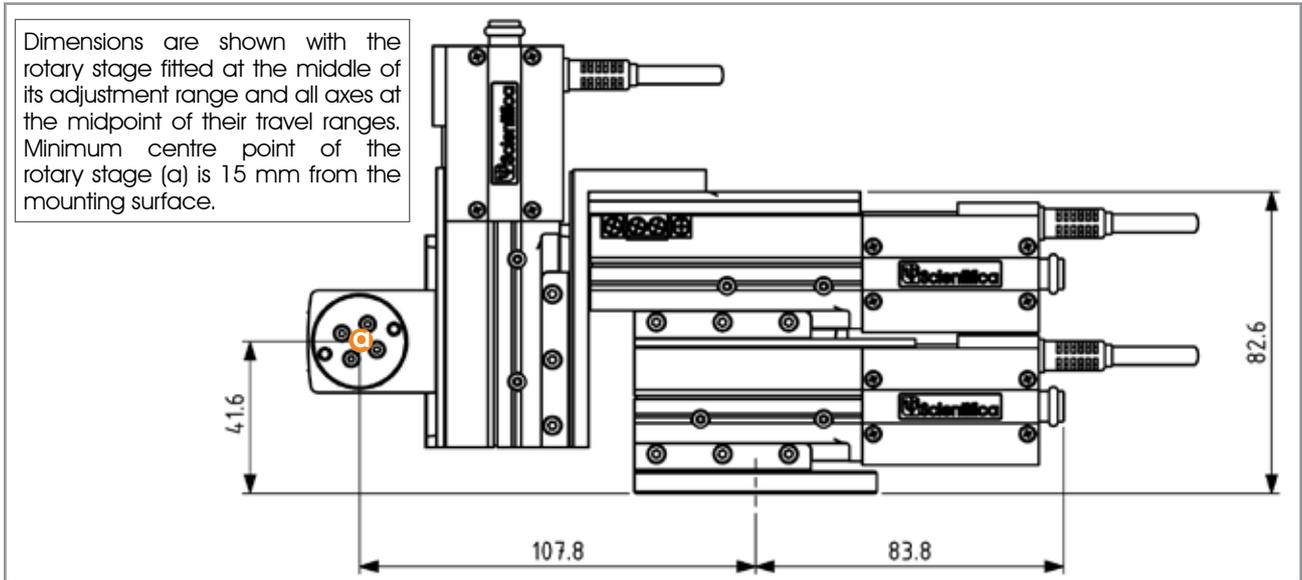
A touchscreen variant is also available, increasing the number of devices that can be controlled from the two that the standard PatchPad can switch between.

### LinLab Software

**LinLab** allows the user to set movement speed, direction, step sizes; and store unlimited memory positions.

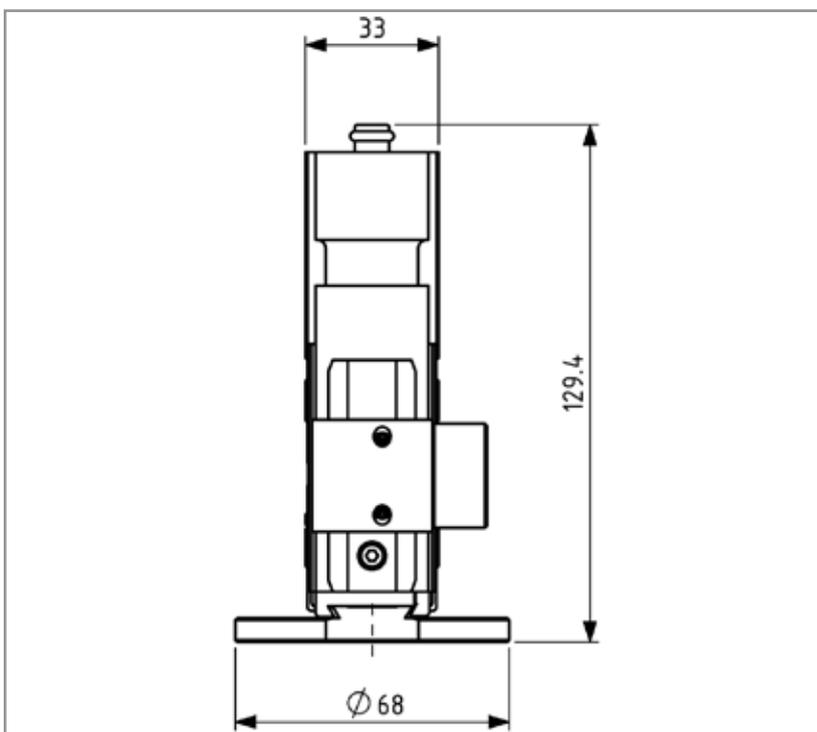
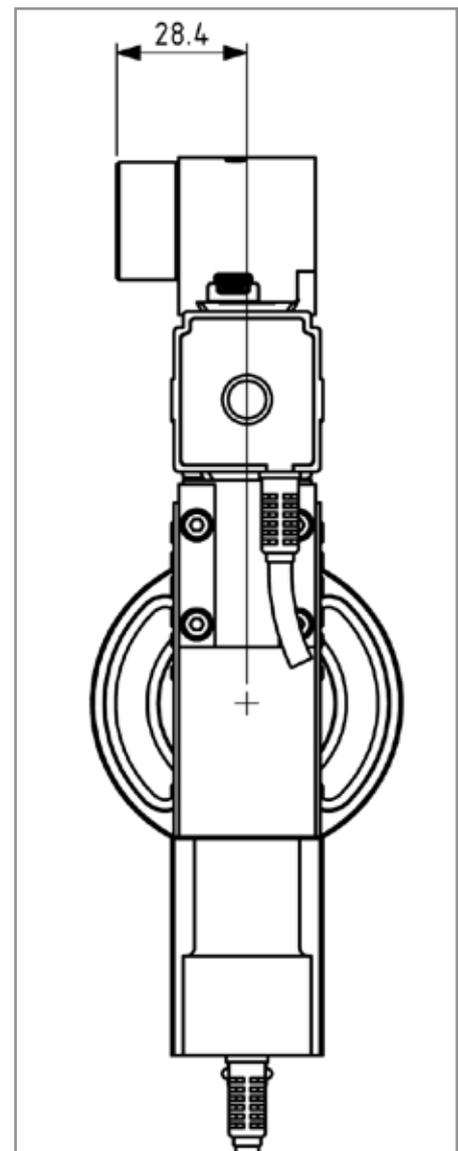
They are able to control up to 12 devices using a tab selection menu.

## Schematics and specifications



### Specifications

Number of axis	3 with virtual 4 <sup>th</sup> axis
Travel distance	20 mm in X & Z axes, 14 mm in Y axis
Step size	0.1 $\mu\text{m}$
Bearings	Crossed roller
Speed	(minimum) 1 $\mu\text{m}$ per second (maximum) 4 mm per second
Electronic resolution	20 nm
Memory positions	Up to 50 (unlimited via Linlab)
Software	LinLab for Windows



## Ordering information

Product Option	Code
1 MicroStar Micromanipulator	MST-1000
2 MicroStar Micromanipulators	MST-2000
3 MicroStar Micromanipulators	MST-3000
4 MicroStar Micromanipulators	MST-4000
5 MicroStar Micromanipulators	MST-5000
6 MicroStar Micromanipulators	MST-6000
7 MicroStar Micromanipulators	MST-7000
8 MicroStar Micromanipulators	MST-8000

Order numbers should be appended with the following codes to designate choice of control device:

C = Control Cube

J = JoyStick

P = PatchPad

PT = PatchPad Touch

All MicroStar micromanipulators include; vertical rotation stage, high-precision rotary sensor (for angle detection), dovetail slide and sliding carriage, 1U mounted rack controller (and all cabling), a hardware controller of your choosing (see above and LinLab software for Windows).

**Please speak to a member of our product specialist team if you need assistance in selecting the most appropriate equipment for your requirements.**

## Warranty and support

Scientifica's success is founded on supplying superior support and application of our significant manufacturing experience. We would therefore really value the opportunity to understand your applications better and to offer no obligation advice on equipment, configurations and compatibility.

All Scientifica instruments are sold with a two-year warranty giving you complete peace of mind. This covers all defects in manufacturing and materials. In this unlikely event, Scientifica will remedy either by repair or replacement.

Our team of customer support engineers is dedicated to providing you with the very best advice and support, should you experience any difficulties with our products. With all products we offer a complete installation support service.

## Youtube Channel

Find out more about the Scientifica range of products and interviews on our channel:

[www.youtube.com/scientificauk](http://www.youtube.com/scientificauk)



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