PRIOR
Scientific

# ProScan™ III

High Performance Flexible Microscope Automation Systems


prior.com

# ProScan™ III Universal Microscope Automation Controller

## System Control

Prior Scientific has designed and manufactured precision optical systems, microscopes and related accessories since 1919. This wealth of experience is matched by a commitment to customer service that has earned Prior an enviable reputation for excellent support. These values, plus our understanding of microscopy, provide a unique foundation for the development of an advanced range of motorized stage systems for microscopy and image analysis applications.

Prior proudly introduces the ProScan III system which sets new standards in automated microscopy. Modular by design, a wide range of stages are available for most upright and inverted microscopes.


### Advanced and Powerful Control

Like the ProScan range of motorized stages, this advanced controller has been designed and manufactured by Prior Scientific. The compact and modular design is capable of controlling, a motorized stage, a focus motor, filter wheels and shutters with the speed, accuracy and precision required by today's highly automated and demanding applications. Four programmable TTL inputs and outputs allow the unit peripherals or external cameras to be controlled via TTL. The advanced internal software allows for simple control of all accessories via RS232 or USB, and a SDK is supplied for easy integration into third party software. Access to acceleration, speed and even drive current is also made available for more advanced users to allow total customization of the unit. Prior ProScan III controller supports control of up to 9 axes, 6 of which can be customized for OEM applications. Speed, acceleration and current can be individually programmed for all OEM axes.

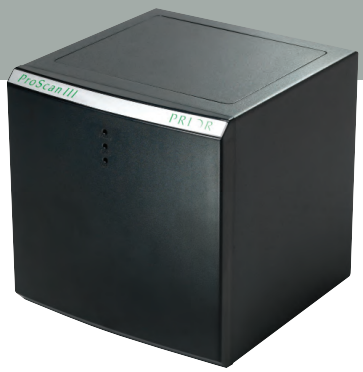

Additionally each axis can be encoded to provide highly repeatable closed loop control. Any stepper motor driven axis in an OEM system can now be driven by one ProScan controller along with Prior standard stages, focus and accessories.

### Intelligent Control

Prior Scientific accessories utilize the plug and play features of the ProScan system. These have been improved in ProScan III so that each stage's individual settings are stored on the stage, which complements the patented IST (Intelligent Scanning Technology) and enhances the performance of the ProScan range of stages. ProScan III defies obsolescence by utilizing a user friendly, web downloadable, firmware upgrade. For the most demanding imaging applications which require high accuracy, speed and repeatability, ProScan III provides the option to encode all motor axes.

### Advanced Communications

The system includes fast RS232 (115200 baud) with programmable TLL to control the movements of a stage, focus motor, filter wheels and shutters for fast, real time interfacing and camera control.



## Modular System

ProScan III provides a modular approach to minimize the footprint of the controller. The cubic design provides stylish looks with a footprint of only 177x177mm. The base unit is designed to accommodate a three axis system, e.g., a stage and focus. Additional functionality can be added to the unit via modular sections which allow easy expansion. The ancillary box accommodates extra functionality such as, filter wheels and shutters or programmable OEM axes. More than one ancillary box may be added.

## Configured to Your Requirements

ProScan III can be expanded horizontally or vertically to accommodate increased functionality, easing the pressure on the limited space in modern labs.

## Expandable

Expand the system to fit under or on shelves or in rack mounted systems, reducing the footprint and preserving valuable desk space.

## Joysticks, Digipots and Touchpad

The CS200XY XY joystick and CS200Z Z axis digipot are low cost, compact joysticks that have the performance required for the most demanding applications. The separation of the manual controls for the XY stage from the Z axis mimics actual microscope operation providing ergonomic benefits of two handed operation, increasing ease of focus and throughput when manually scanning samples. The design of the new joystick system has a smaller footprint (90x90mm) than the current joystick models. Joysticks are easily connected via daisy chain and can be positioned for flexibility and maximum comfort for both right and left hand users.

Complementing the CS200XY and CS200Z is the Surface Pro touchpad and compatible software suite from Prior. The intuitive layout of this application makes control and system setup quick and easy!

## IST and Stage Specifications Explained

GB Patent No. 2411249 : US Patent No. 7330307

To enable IST (Intelligent Scanning Technology), Prior measures the accuracy of every stage made, then by storing this data on the stage, the ProScan III can adapt the requested movements to enhance the performance of the stage.

For full mapping, implemented for larger stages, the frequency of measurements across the stage is increased to significantly improve metric accuracy. This is ideal for high precision metrology applications.

### Nomenclature

It is easy to be confused by figures, but here at Prior we pride ourselves on providing information on the true performance of our stages. This is a quick guide to the terminology used when describing accuracy and repeatability.

**Metric Accuracy:** The accuracy of the movement compared to a standard. For example, if the stage is asked to move 1mm how close to 1mm will it move? (Important for virtual slide scanning and tiling images).

**Uni-directional Repeatability:** This measures the ability of the stage to return to the same point when approaching from the same direction each time. (Important for OEM customers and multi-positional time-lapse experiments).

**Bi-directional Repeatability:** This measures the ability of the stage to return to the same point when approaching from any direction. (Important for multi-positional time-lapse experiments).

**Directions (When facing the microscope):**
X is left to right. Y is front to back.

# High Precision Motorized Stages

### Precision Stepper Motors

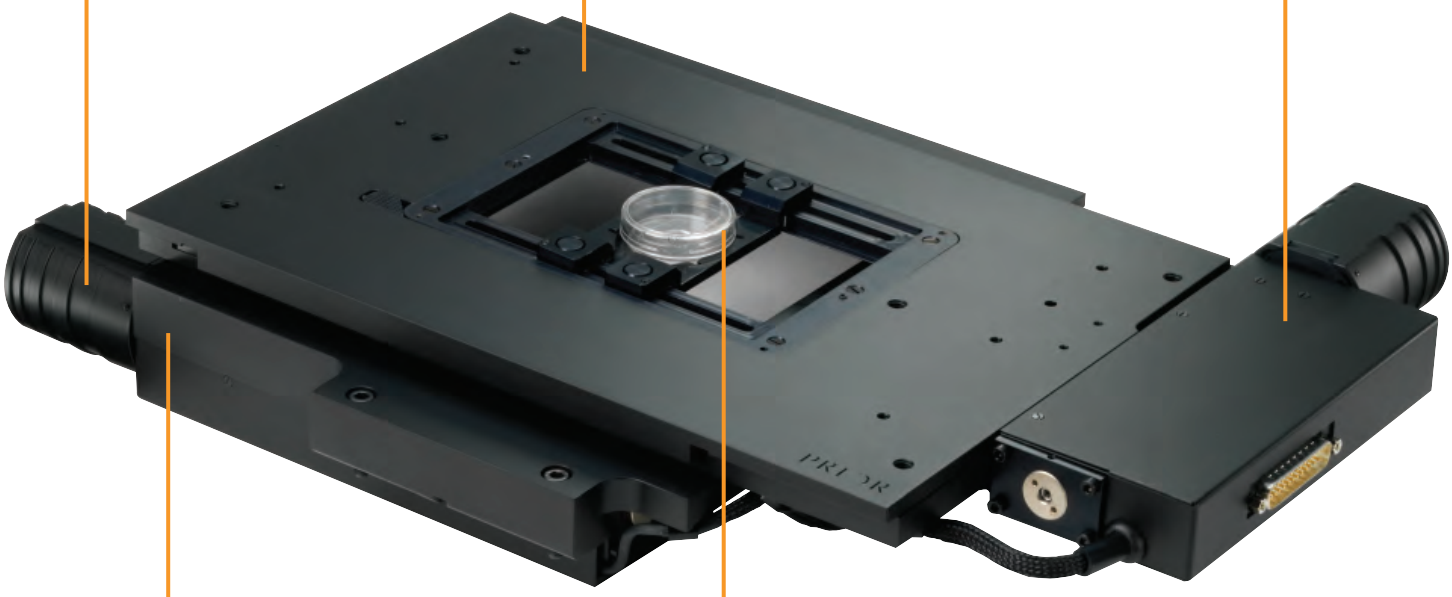
Quiet and precise stepper motors ensure exact positioning of the stage while the use of micro-stepping provides very smooth motion even at low speeds. Linear motors are available to allow both high accuracy and smooth motion at low speed plus high acceleration and speeds of up to 300mm/s.

### Cast Aluminum Plate

Prior stages are precision machined from specially cast aluminium plates which are lightweight and provide excellent dimensional stability.

### Precision Ball Screws

High accuracy ground ball screws provide smooth and maintenance free motion. The pre-loaded re-circulating ball screw nuts ensure zero backlash. The whole ball screw assembly is connected to the motor with an anti-backlash nut. Ball screws of various pitch are available for each stage to optimise the stage for speed and accuracy.



### Adjustable Limit Switches

The flexibility to reduce the travel range of the stage to match your application will avoid damaging collisions with the microscope. The limits are internal to the stage to provide a tamper-proof solution and datum point automatically referenced by the ProScan firmware.

### Wide Range of Specimen Holders

ProScan stages are available for a wide range of applications involving specimens such as slides, micro titre plates, Petri dishes, metallurgical samples and semiconductor wafers. Specimen holders are anodized black to provide excellent wear resistance. Custom designs are always considered.

### H101A Range

Stage for upright microscopes, providing a travel range suitable for well plates at 114x76mm. Stages can be configured with 2mm ball screws and 200 step motors for high speed applications or 1mm and 400 step motors for high accuracy applications. Both options can be fitted with high precision encoders. Includes IST for improved metric accuracy.

### H101F Flat Top

Ultra flat stage for upright microscopes, providing the same high specification as the established H101A series of stages. The H101F situates the sample at the highest point of the stage surface giving the maximum objective clearance possible.

### H117 Range

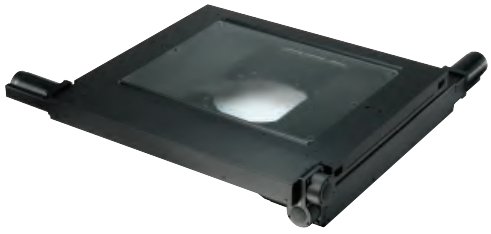
Stage for inverted microscopes, providing a travel range suitable for well plates at 114x76mm. Stages can be configured with 2mm ball screws and 200 step motors for high speed applications or 1mm and 400 step motors for high accuracy applications. Both options can be fitted with high precision encoders. Includes IST for improved metric accuracy.

### H138A Range

Stage for upright microscopes, providing an extended axis travel range suitable for eight slides at 240x76mm. Stages are configured with 2mm ball screws and 200 step motors. 100 nanometer encoders are available for high accuracy applications. Includes IST for improved metric accuracy.

### H105 Range

Stage for upright microscopes, providing a large travel range suitable for 6 inch wafers at 154x154mm. Stages configured with 2mm ball screws for high accuracy and high speed applications. Can be fitted with high precision encoders. Includes full mapping.

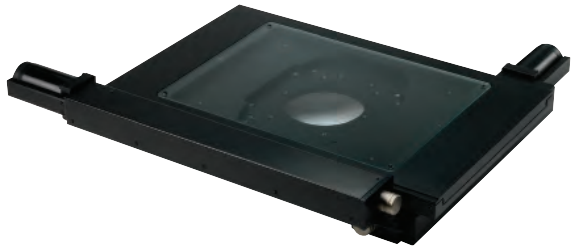


### H112 Range

Stage for upright microscopes, providing a large travel range suitable for 12 inch wafers at 302x302mm. Stages configured with 2mm ball screws for high accuracy and high speed applications. Can be fitted with high precision encoders. Includes full mapping.

### HT1111LC

Solid frame stage for reflected light applications such as hardness testing. 108x108mm travel is suitable for a wide range of applications. Includes IST for improved metric accuracy.

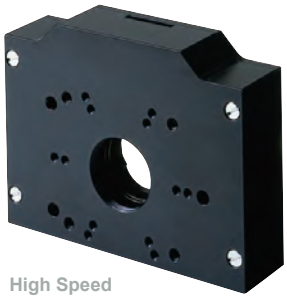


### H116 Range

Stage for upright microscopes, providing a large travel range suitable for 8 inch wafers at 255x215mm. Stages configured with 2mm ball screws for high accuracy and high speed applications. Can be fitted with high precision encoders. Includes full mapping.

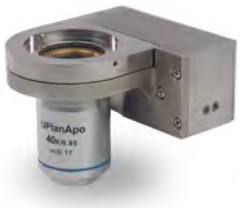
# Accessories

Filter Wheels



High Speed Shutters

Focus Drives



OP400 Objective Scanner

SP400 Sample Scanner

PF850
Laserauto Focus


Brightfield LED

## Accessories Controlled by ProScan™ III

### High Speed Filter Wheels

The high speed filter wheel system delivers smooth operation and changes filter positions in as little as 55ms. There are several wheel options available: 8 and 10 position (32mm diameter filter) wheels and 6 and 10 position (25mm diameter filter) wheels that can be installed on most microscopes in the excitation or emission channels.

### High Speed Shutters

The filter wheels can be used stand alone or combined with a fast shutter (10ms) to provide total light control. Adaptors are available to connect to most microscopes on the excitation, emission or brightfield locations.

### Focus Drives

A range of easy to fit motorized focus mechanisms for accurate control of microscope focusing. Encoded focus and optical limit switches are also supported by ProScan III. Step sizes as small as 2nm give precise and repeatable positioning for the Z-axis. For high speed focus moves for stereo microscopes the focus can be driven up to 60 rev/s.

### Nanopositioning Piezo Objective and Sample Scanners

The NanoScan OP400 Nanopositioning Piezo objective scanner provides the fastest step and settle time of any objective positioner available. Incorporating capacitive feedback sensors, it also has market leading positioning accuracy and resolution. Delivering the best positioning performance and fastest recovery between Z stacks, the NanoScan SP range of Piezo driven stages are compatible with the Prior motorized stage as well as many common microscopes when using appropriate adapter plates.

### Laser Autofocus System

Prior Scientific's laser autofocus systems provide real time focus for most infinity corrected optical systems on the market. With advanced optics and an intelligent in-built microprocessor, Prior Scientific's laser autofocus helps to drive the position of the microscope and optics relative to the sample of interest into an "in focus" condition. The new PureFocus850 is designed for both biological and industrial samples.

### Brightfield LED Illuminator

The Brightfield LED Illuminator provides all the advantages of LED illumination in a flexible package that can be fitted to most modern upright and inverted microscope systems. Instant on/off and simple intensity control make the Brightfield LED an ideal replacement for traditional halogen and mechanical shutter applications.

## Automated Sample Loading and Scanning

**SL160 Slide Loader System**
The Prior SL160 Slide Loader is a fast and easy-to-use system to automate your slide scanning process. Prior has over 20 years of experience in slide loading and the SL160 has been designed from the ground up for the ultimate in robustness and reliability. This next-generation slide loading system has fully integrated sensors and encoders. Extensive life testing has proven its reliability in loading over one million slides.

The SL160 has a high capacity of 160 slides. Its open system architecture allows you to use a wide variety of microscopes and optics. It is the perfect platform to build your applications for imaging high volumes of slides with precision and reliability.


SL160

PLW20

## Automated Well Plate Loading and Scanning

**PLW20 Well Plate Loader System**
Adaptable to most modern inverted microscopes, the simple, rugged and compact PLW20 provides three independently controlled and encoded axes for rotational, vertical and horizontal movement. Combine the PLW20 with a Prior ProScan stage for your inverted microscope and you have a system designed specifically for high content screening applications with a capacity of 20 well plates (two racks of 10 each). The two stainless steel racks provided with each loader accommodate covered and uncovered well plates up to 19mm in height.

Sensors monitor the presence of well plate racks so that the system can be programmed to respond when racks are changed in the middle of a run. Additionally, the DLL provided with the PLW20 is compatible with ProScan III stage and focus controllers.

## Physiology Platforms

### Motorized ZDeck Quick Adjust Platforms

Compatible with the Proscan III system, the ZDeck Quick Adjust Platform enables users to increase their productivity by allowing them to image multiple areas of interest with speed and precision. Compatible with most microscopes, the ZDeck is controlled using the ProScan operating system and has a travel range of 65mm x 65mm with the ability to add micromanipulators at each side.

ZDeck

OpenStand

## Custom Optical Systems

### OpenStand Custom Microscopes

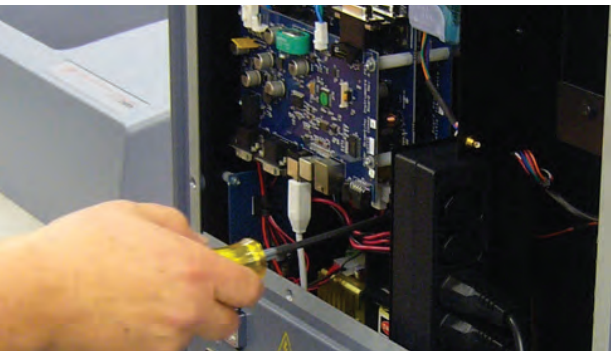
Prior Scientific has developed OpenStand to offer a working platform to build OEM solutions and one-off customizations providing excellent value and reduced development time. Whether developing new automation techniques and software or developing new imaging methods, you can quickly find that you need a microscope system tailored to your application and business needs. With OpenStand, you get a working system to start developing your application immediately, and adaptations can easily be made during your development phase.

OpenStand LS

### OpenStand LS Models

OpenStand LS is the latest addition to the OpenStand product family to provide customers with OEM optical solutions and one-off custom microscopes faster. Created for large format XY stages, the OpenStand LS includes all the features necessary to meet the needs of the most demanding semiconductor and materials imaging applications. Fluorescence and brightfield/darkfield epi-illumination options together with existing Prior automated accessories are available for all of your material applications.

# Branded, Special and OEM Systems




### Made to Measure from Prototype to Manufacture

At Prior Scientific we control the design and manufacturing process for all our automated microscope products. This way, we can be sure of offering high quality and flexible service.

This approach along with our commitment to customer service means that Prior Scientific is uniquely placed to provide complete systems to match your exact specifications. From branded products to entirely unique solutions Prior has the tools to provide for your needs.

Our design engineering department employs the latest in computer aided 3D modelling along with many years of experience in the design and manufacture of scientific instruments. It is here that quality and reliability are designed into our products. Advanced CNC machines and computer aided manufacturing systems are used to produce high quality components. In assembly, experienced instrument makers build complete stage and controller assemblies with care and attention to detail.

It is this blend of skills and experience that have established Prior as one of the world's leading manufacturers of automated microscopy products and OEM systems.

## ProScan™ III Specifications

| | |
|---|---|
| Power | Universal mains input<br>110/240 VAC 50-60Hz |
| Computer Interface | USB (Virtual COM)<br>RS232C |
| COM Port Communications Protocol | 8 bit word, 1 stop bit, no parity, no handshake, baud rate options of 9600, 19200, 38400 and 115400. |
| Controller Dimensions | Cube: Width, height and depth 177mm<br>(Ancillary box add 59mm) |
| Controller Weight | 3kg (1kg for ancillary box) |

| | |
|---|---|
| Stage Speed | Up to 300mm/s |
| Step Size | From 0.01µm for XY, 0.002µm for Z |
| Repeatability (Focus/Stages) | Typically <1µm |
| Linear Scales | 0.1µm or 0.05µm options available |
| Ball Screws | Zero backlash, ground recirculation ball screws, 1mm, 2mm, 4mm or 5mm options available. |
| Limit Switches | Adjustable in X and Y<br>Optical and mechanical available in Z |

**UNITED KINGDOM**
Prior Scientific Instruments Ltd.
Units 3-4 Fielding Industrial Estate
Wilbraham Road, Fulbourn
Cambridge, CB21 5ET
United Kingdom
Email: inquiries@prior.com
Phone: +44 (0)1223 881711

**U.S.A.**
Prior Scientific, Inc.
80 Reservoir Park Drive
Rockland, MA. 02370
U.S.A.
Email: info@prior.com
Phone: 781.878.8442

**GERMANY**
Prior Scientific Instruments GmbH
Maria-Pawlowna-Str. 4 07743
Jena
Germany
Email: jena@prior.com
Phone: +49 (0)3641 675 650

**JAPAN**
Prior Scientific KK
Kayabacho 3rd Nagaoka Bldg 10F,
2-7-10, Nihonbashi Kayabacho,
Chuo-Ku, Tokyo103-0025
Japan
Email: info-japan@prior.com
Phone: 03-5652-8831

**CHINA**
Prior Scientific Instruments (Suzhou) Ltd.
Room 1812, Honghai Building,
72 Xingdu Street, Suzhou Industrial Park, Suzhou, 215000
China
Email: info-china@prior.com
Phone: +86 (0)512 6617 5866