

# BioPrecision Focus Control

Focus control is available as either a simple motorized focus drive or a completely automatic video autofocus. The programmable, motorized focus enables the microscope or other imaging device to programmatically move the microscope focus. With the addition of the LEP video autofocus processor the system has the ability to automatically focus.

Focus control is an essential aspect of microscope automation that should be carefully considered. Whether the application is simple image acquisition or more sophisticated three dimensional reconstructions, every system can benefit from focus control. Ease of use, remote control, automated processing are a few of the advantages.

Typically, in an electronic imaging application, the operator is using either a video monitor or a live computer image to view. The ergonomics of operating the microscope focus while observing the image remotely is uncomfortable at best. The addition of a remote focus control makes it more comfortable and easy to focus.

## Focus

## Standard Focus Drive Motor

- Universal microscope mount
- Maintains microscope coarse focusing capability
- High resolution
- Optional optical encoder



The standard LEP focus drive motor provides simple high resolution, high performance focus control. When driven with the MAC 5000 controller system, the drive motor has a final drive resolution of 0.01-0.02 $\mu$ m for most microscopes.

Mounting the motor is simple and straightforward. Using a supplied adapter ring, the outer sleeve is clamped to the coarse focus knob. The fine focus is then coupled to the motor shaft. After installation, full coarse focusing capability is retained and fine focus accomplished with the MAC 5000 digipot control. In the power-down state, the fine focus can be manipulated by hand.

### Specifications

Resolution ..... up to 40,000 steps/rev.  
Optional encoder resolution ..... 10,000 cpr.  
End limits ..... none  
*note: Z-axis performance is dependent on the condition of the microscope.*

### Ordering Information

99A400 ..... Standard focus drive motor and bracket  
99A401 ..... Focus drive motor and bracket with high resolution encoder  
90M028 ..... Installation manual

*note: all focus drive motor/brackets include mounting ring for a specific microscope.  
Please specify the exact model microscope when ordering. See the compatibility matrix in this section for replacement part numbers.*



- Specific design for Zeiss Axio microscopes
- Permanent microscope installation
- Adjustable upper and lower limits
- High resolution encoder position feedback

The Zeiss Axio line of microscopes requires a dedicated focus drive motor. The 99A402 focus drive motor is specifically designed to mount to the Zeiss Axio microscopes and provide high performance focus positioning.

This focus drive uses a high resolution rotary encoder mounted to the coarse focus shaft to determine focus position at all times. The stepper drive motor is coupled to the fine focus shaft of the microscope.

Adjustable upper and lower limits provide an accurate position reference as well as protection from potentially damaging objective crashes.

## Specifications

Encoder resolution .....	0.1µm
Motor resolution .....	0.02µm
End limits .....	Adjustable optical upper and lower limits

*note: Z-axis performance is dependent on the condition of the microscope.*

## Ordering Information

99A402 .....	Zeiss AxioFocus drive motor/bracket
90M010 .....	Installation manual

## Focus

## Linear Encoder Option

- Custom mounts available for most microscopes
- High resolution position feedback without drive errors
- Essential for 3D measurement and reconstruction

Strict motor control or the microscope focus is subject to deficiencies inherent in the microscope mechanics. Typically most microscope focusing mechanics are not accurate to the sub-micron level. When trying to position a stage to a programmed z-height with sub-micron precision the typical microscope will show problems with either repeatability, accuracy or both.

The LEP linear encoder focus option provides a means to enhance the microscope focus with an accurate, repeatable focus position encoder. This encoder measures the actual z-position of the stage.

Each microscope requires a custom bracket to mount the encoder. In almost every case the encoder is mounted to the microscope using existing mounting holes, and does not interfere with any normal operation of the microscope.

The linear focus encoder works in conjunction with the focus drive motor. Operation is transparent. The MAC 5000 control system reads the focus position and moves according to that input. The MAC 5000 can also be programmed to servo the z-position to the encoder input to compensate for drift or vibration effects.



### Specifications

Resolution .....	0.05µm
Numeric Repeatability* .....	0.1µm
Measuring range .....	12mm
Accuracy* .....	<0.15µm over full range
*actual accuracy and repeatability is somewhat dependent on the microscope	

### Ordering Information

99A420 .....	Focus drive encoder, requires bracket (see below)
99A450 .....	Limit/Encoder bracket for Zeiss Axioskop 2
99A451 .....	Limit/Encoder bracket for Zeiss Axiovert 100/135
99A452 .....	Limit/Encoder bracket for Zeiss Axioskop
99A453 .....	Limit/Encoder bracket for Leica DMIRB
99A454 .....	Limit/Encoder bracket for Zeiss Axioplan I and 2
99A455 .....	Limit/Encoder bracket for Olympus BX 40/50
99A456 .....	Limit/Encoder bracket for Leica DMLB
99A457 .....	Limit/Encoder bracket for Nikon TE 200/300
99A458 .....	Limit/Encoder bracket for Zeiss Axiovert 200
99A459 .....	Limit/Encoder bracket for Zeiss Axioplan 2
99A460 .....	Limit/Encoder bracket for Olympus IX-70

note: all microscope mounts are different, call for availability and ordering information for your specific application

## Compatibility Matrix

## Focus

Microscope Model(s)		Adapter P/N
Hund	Seiler H5022	74-F001316
Jena	Lumar	74-F001370
Leica	DM-RB, DM-IRB	74-F001310
	Orthoplan, Metalloplan	74-F001311
	Ergolux, Ergolux 200, Orthoplan(new)	74-F001312
	Aristoplan	74-F001313
	Laborlux 12	74-F001314
	Aristroplan, Laborlux 12, Laborlux D, Metalux, Ortholux	74-F001315
	DMIL, Laborlux S	74-F001316
	DMLS	74-F001317
	Polycon, Polyvar, PolyvarSC, Polylite, INM20	74-F001318
	Diavert	74-F001319
	MEF4M	74-F001350
Nikon	Microphot SA, Labophot2, Optiphot series (except Optiphot 66, Optiphot 88)	74-F001300
	Microphot S, FX, FXA	74-F001303
	Biononoscope	74-F001306
	Diaphot TMD, Fluorphot, Labophot, MM-11, MM-22, Optiphot 66, Optiphot 88	74-F001307
	Labophot 2A	74-F001315
Olympus	BH2, BH3, BHMJ, BHS	74-F001330
	IMT-2	74-F001331
	BX series, BHMJ-001	74-F001300
Zeiss	Standard	74-F001350
	Axioplan, Axioplan II, Axiovert, Axiovert 100, Axiovert 135	74-F001360
	Universal	74-F001361
	Photomicroscope III	74-F001363

