



**Variable Intensity  
Lamp Control**

**for  
HBO 100 Arc Lamps**

**Installation and Operations Guide**



## WARNING

THERE ARE NO USER SERVICEABLE CONTROLS OR PARTS INSIDE THE MAIN POWER SUPPLY UNIT OF THE ATTOARC. DO NOT REMOVE THE COVER SCREWS OR THE COVER AT ANY TIME SINCE HIGH VOLTAGES CAN BE PRESENT EVEN WHEN THE UNIT IS UNPLUGGED FROM THE MAIN POWER SOURCE. REPAIRS TO THIS UNIT MAY ONLY BE PERFORMED BY AUTHORIZED PERSONNEL.

NEVER IGNITE AN ARC LAMP WHICH IS NOT COMPLETELY INSTALLED IN ITS PROPER HOUSING AND ATTACHED TO THE MICROSCOPE. AN ARC LAMP IS A SOURCE OF INTENSE MULTI-SPECTRAL IRRADIATION. THIS UV AND INFRARED IRRADIATION CAN CAUSE SERIOUS DAMAGE TO YOUR EYES AND SKIN FROM DIRECT OR REFLECTED CONTACT WITH THE BEAM. PROPER ALIGNMENT OF THE ARC LAMP CAN BE ACHIEVED WHILE IT IS ATTACHED TO THE MICROSCOPE USING THE PROCEDURES DESCRIBED IN THIS GUIDE.

SAFETY GLASSES AND PROTECTIVE GLOVES SHOULD BE USED WHEN CHANGING THE HBO 100 LAMP. CAUTION- NEVER CHANGE A HOT LAMP. WHEN THE LAMP IS HOT IT IS UNDER PRESSURE AND COULD EXPLODE. ONLY EXCHANGE THE LAMP AFTER THE BULB HAS COOLED TO ROOM TEMPERATURE.

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**AttoArc™**  
**Variable Intensity Lamp Control**  
**Installation and Operations Guide**

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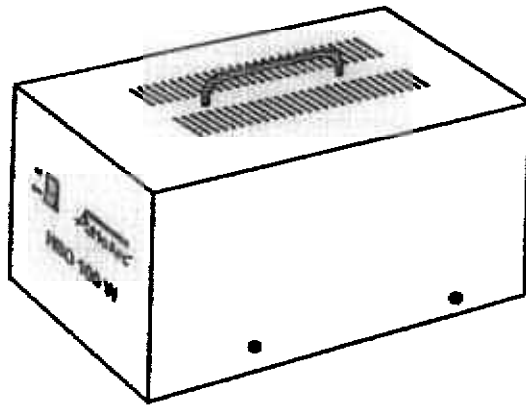
## Unpacking and Parts List

### AttoArc™ Variable Intensity Lamp Control

This specialized power system provides the power to one HBO 100 arc lamp and enables digital intensity control and reading of its elapsed hours from the pendant which plugs into the power supply. Included in this system is an intermediate lamp socket assembly, lamp socket adapter, copper wire loop, intensity control pendant and the main power supply. Carefully unpack each component and follow the instructions for installation on pages 4 and 5.

#### A. POWER SUPPLY AND LINE CORD:

The power supply section of the AttoArc contains the appropriate circuitry to provide regulated power to an HBO 100 arc lamp. This microprocessor controlled unit incorporates advanced technology enabling precise and stable control of the arc intensity from about 15% to the full rated 100W output of the lamp. The Zeiss lamp socket, the AttoArc intermediate lamp socket assembly, the control pendant, and 110v 60 Hz AC line cord attach to the back of this unit. **THERE ARE NO USER SERVICEABLE PARTS IN THIS UNIT.**



#### B. CONTROL PENDANT WITH CORD:

The HBO 100 arc lamp Intensity can be varied between full intensity and about 15% of its full power with this control pendant. It is also possible to set two intensity levels and switch between them. The digital display indicates the percentage of the current wattage scaled between about 15 and 100 watts. In addition, the elapsed time on the lamp can be read from this device.



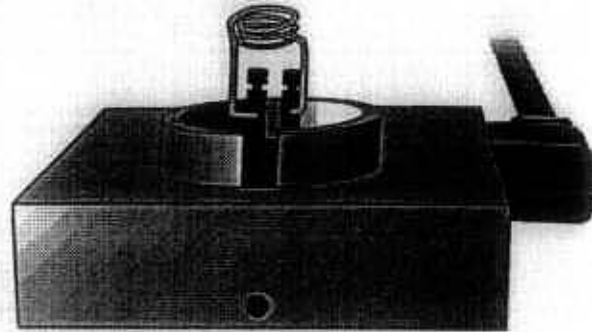
**C. ATTOARC LAMP SOCKET ADAPTER:**

This stainless steel adapter needs to be permanently installed in the Zeiss lamp socket and securely fastened. Once installed (with the set screw facing forward) a lamp can be replaced simply by loosening the set screw, removing the old lamp, installing a new lamp and retightening the set screw.



**D. ATTOARC INTERMEDIATE LAMP SOCKET ASSEMBLY:**

The intermediate lamp socket assembly should be permanently installed on the Zeiss lamp socket. Take care not to bend the coil which stabilizes lamp performance when low power levels are required.



**E. COPPER WIRE WITH LOOP FOR CONNECTING LAMP TO ELECTRODE:**

This wire is longer than the one supplied with the Zeiss lamp socket so that the proper connection can be made between the supply electrode with the knurled thumb screw on the Zeiss lamp socket and the lamp heat sink on the top of the lamp.



**F. ATTO WRENCH (3/32" BALL END SOCKET WRENCH):**

This wrench is used to permanently attach the AttoArc intermediate lamp socket assembly to the Zeiss lamp socket and to secure the lamp to the AttoArc lamp socket adapter.



**G. INSTALLATION AND OPERATIONS GUIDE (THIS DOCUMENT):**

## Installation

The AttoArc Variable Intensity Lamp Control for HBO 100 arc lamps provides the ability to vary the intensity of the lamp from its full 100 watt output down to about 15% intensity. The system utilizes the Carl Zeiss HBO 100 lamp socket (448016), lamp housing (447216), quartz collector (467275) and appropriate HBO 100 lamp in conjunction with the AttoArc components. These components include the power supply module, digital control pendant, AttoArc lamp socket adapter, AttoArc intermediate lamp socket assembly and copper wire with loop.

### 1. Unpack the AttoArc components

- a. Check these components against the parts list of this manual.
- b. In addition, make sure that you also have the following components:  
Zeiss lamp socket (448016), Zeiss quartz collector (467275),  
Zeiss lamp housing (447216), HBO 100 lamp bulb.

### 2. Install the AttoArc Lamp Socket Adapter (C)

#### ⚠ FIRST DISCONNECT MAIN POWER CORD

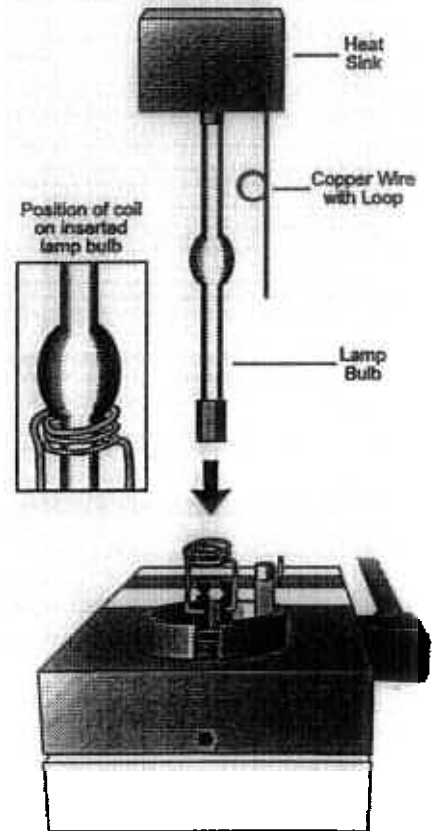
- a. Insert the *AttoArc Lamp Socket Adapter (C)* into the Zeiss HBO 100 lamp socket (448016).
- b. Align the set screw on the *AttoArc Lamp Socket Adapter (C)* toward the front of the Zeiss lamp socket and away from the lamp socket supply cord.
- c. Firmly secure the *AttoArc Lamp Socket Adapter (C)* into the Zeiss HBO 100 lamp socket using the forked wrench supplied with the Lamp Socket.

The *AttoArc Lamp Socket Adapter (C)* should never need to be removed. HBO 100 lamp bulbs will be installed into the *AttoArc Lamp Socket Adapter (C)* and secured with the set screw of the *AttoArc Lamp Socket Adapter (C)* using the *Atto Wrench (F)*.

### 3. Install the AttoArc Intermediate Lamp Socket Assembly (D)

#### ⚠ FIRST DISCONNECT MAIN POWER CORD

- a. Carefully position the *AttoArc Intermediate Lamp Socket Assembly (D)* with Coil onto the Zeiss HBO 100 lamp socket which already has the *AttoArc Lamp Socket Adapter (C)* installed. This adapter should sit flat on the collar of the Zeiss HBO 100 lamp socket.
- b. Firmly secure the *AttoArc Intermediate Lamp Socket Assembly (D)* with the three set screws on the front and both sides of the *AttoArc Intermediate Lamp Socket Assembly (D)* using the *Atto Wrench (F)*.
- c. Make sure that the coil is lined up and concentric with the *AttoArc Lamp Socket Adapter (C)*.
- d. If the Zeiss lamp socket has a borehole to receive the safety switch post from the Zeiss lamp housing, make sure that the recessed retracted post in the *AttoArc Lamp Socket Adapter (C)* can be extended into the Zeiss lamp socket. This can be tested by depressing the retracted post in the *AttoArc Lamp Socket Adapter (C)* with the *Atto Wrench (F)*.



#### 4. Install the HBO 100 Lamp Bulb

##### FIRST DISCONNECT MAIN POWER CORD

Warning: never touch the glass portion of the HBO 100 lamp bulb with your hands and observe the safety precautions listed at the front of this guide.

- a. Insert the *Copper Wire with Loop (E)* supplied with the *AttoArc* into the lamp heat sink supplied with the Zeiss HBO 100 lamp socket.
- b. Securely tighten the *Copper Wire with Loop (E)* into place using the allen wrench supplied with the Zeiss HBO 100 lamp socket.
- c. Insert the narrow end of the HBO 100 lamp bulb into the lamp heat sink.
- d. Tighten the HBO 100 lamp bulb into the heat sink with the tension screw of the lamp heat sink using the Zeiss 3 mm wrench.
- e. Insert the wide end of the lamp bulb into the *AttoArc Lamp Socket Adapter (C)* while inserting the free end of the *Copper Wire with Loop (E)* into the hole at the top of the electrode post on the Zeiss HBO 100 lamp socket.
- f. Position the lamp bulb assembly so that the lamp bulb passes through the coil of the *AttoArc Intermediate Lamp Socket Assembly (D)* and the coil lies just under the bulge in the lamp bulb as shown in the diagram.
- g. Secure the lamp bulb into the *AttoArc Intermediate Lamp Socket Assembly (D)* using the supplied *Atto Wrench (F)*.
- h. Secure the *Copper Wire with Loop (E)* to the electrode post of the Zeiss HBO 100 lamp socket by tightening the knurled knob.

#### 5. Install the Lamp Housing

##### FIRST DISCONNECT MAIN POWER CORD

- a. Attach the Zeiss 447216 lamp housing to the lamp base assembly.
- b. Secure the housing using the Zeiss 3mm wrench. If your lamp housing has a safety switch post which is designed to traverse a borehole in the lamp socket, make sure it is positioned into the *AttoArc Intermediate Lamp Socket Assembly (D)* when installing the lamp housing onto the *AttoArc Intermediate Lamp Socket Assembly (D)*.
- c. Install the quartz collector.
- d. Attach the lamp unit to the microscope.

#### 6. Install the Cables

- a. Attach the cables from the lamp housing and the *AttoArc Intermediate Lamp Socket Assembly (D)* to the power module (A).
- b. Place the control pendant (B) in a convenient position adjacent to the microscope and attach to the power module (A). Make sure that you secure the retaining screws on this cable end to the power unit (A).
- c. The power module (A) can be placed on the floor or on a shelf within about 3 feet of the microscope. ADEQUATE VENTILATION IS REQUIRED— BE SURE NOT TO OBSTRUCT AIR FLOW INTO THE BACK AND TOP OF THE UNIT. Make sure the power switch on the front of the power module (A) is in the off position. Install the 110v main line cord into the back of the power module (A) and plug it into a 110 v 60Hz power source.

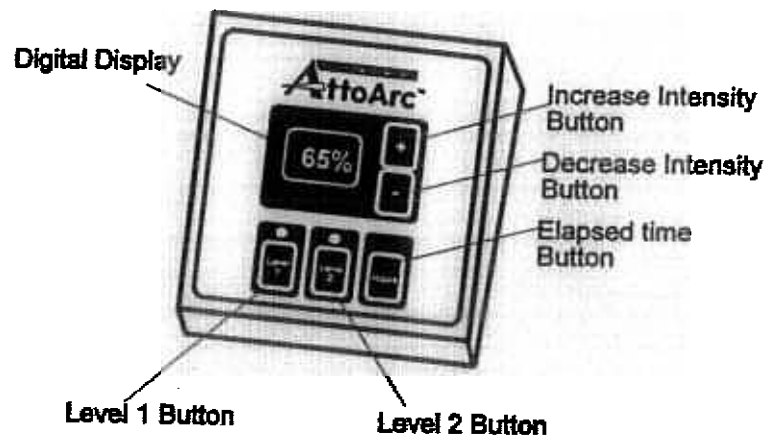
THE ATTOARC IS NOW INSTALLED AND YOU ARE READY  
TO IGNITE AND ALIGN THE LAMP.

## Operation

### 1. LAMP IGNITION:

Turn the on/off switch to the on position on the front of the power unit (A). The green pilot light of the switch should come on and the lamp should ignite. Once ignited the digital display on the control pendant (B) should read 100%. Allow several minutes for the lamp to reach full intensity.

### 2. ATTOARC CONTROLS



#### Level 1 Button

Pressing the Level 1 Button selects the preset intensity level presently assigned to level 1. Once this button is pressed, the arc lamp intensity will switch to the intensity set for level 1, the intensity value shown in the Digital Display will be the level 1 intensity setting, and the red light associated with the Level 1 Button will light. Pressing the Level 1 Button once level 1 has been selected has no effect. When level 1 is selected, adjustments to intensity (+ / -) will only affect the level 1 setting.

#### Level 2 Button

Pressing the Level 2 Button selects the preset intensity level presently assigned to level 2. Once this button is pressed, the arc lamp intensity will switch to the intensity set for level 2, the intensity value shown in the Digital Display will be the level 2 intensity setting, and the red light associated with the Level 2 Button will light. Pressing the Level 2 Button once level 2 has been selected has no effect. When level 2 is selected, adjustments to intensity (+ / -) will only affect the level 2 setting.



#### Increase Intensity Button (+)

Pressing the Increase Intensity Button increases the intensity of the arc lamp until the intensity of 100% is reached. The setting for the currently selected level (level 1 or level 2) is increased by pressing this button. The other level is unaffected. A single press and release of this button will increase the current intensity level by one unit. Holding this button in the down position will increase intensity multiple units with the rate of intensity change increasing with the time that the button is depressed.

#### Decrease Intensity Button (-)

Pressing the Decrease Intensity Button decreases the intensity of the arc lamp until the intensity of 1% is reached. The setting for the currently selected level (level 1 or level 2) is decreased by pressing this button. The other level is unaffected. A single press and release of this button will decrease the current intensity level by one unit. Holding this button in the down position will decrease intensity multiple units with the rate of intensity change increasing with the time that the button is depressed.

#### Elapsed Time Button (Hours)

Depressing the Elapsed Time Button (labeled "Hours") will display the age of the lamp bulb while this button is held in the down position. The age will appear as a time value followed by "h" shown in the Digital Display. The time value displayed is in hours. The elapsed time should be reset (see Timer Reset Button) each time a new lamp bulb is installed. This insures that the hours reading gives the proper age of the current lamp bulb.

#### Timer Reset Button (not shown)

The Timer Reset Button is a recessed button on the back of the AttoArc power supply (A). Pressing this button will set the age of the lamp bulb to zero. This button should be pressed each time the lamp bulb is changed. The age of the lamp bulb can be displayed by depressing the Elapsed Time Button.

#### Digital Display

The Digital Display shows the current lamp intensity or the current age of the lamp bulb.

**LAMP INTENSITY:** The lamp intensity is shown as a percent of available range. The digital display approximates the percentage of the range from 100% intensity to about 15% intensity. Intensity values are followed by a "%" symbol.

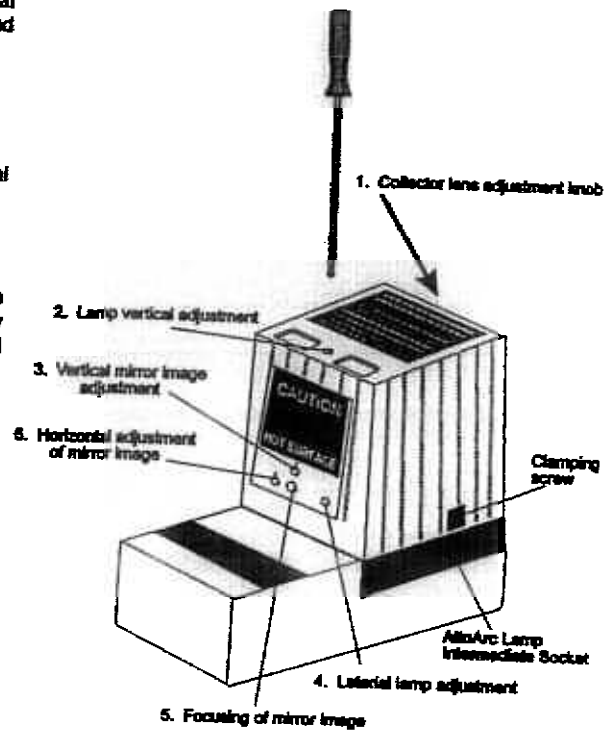
**TIME:** The time elapsed since the last press of the Timer Reset Button is displayed when the Elapsed Time Button is depressed and held in the down position. The time is displayed in hours. Time values are followed by an "h" symbol.

## Lamp Alignment

The assembled lamp housing and lamp socket with AttoArc appear as shown below. The collector lens adjustment is controlled by the black knob adjacent to the collector. All other adjustments can be made with the Zeiss 3mm wrench that is shipped with each Zeiss microscope. The following screws control the following lamp movements and focus functions.

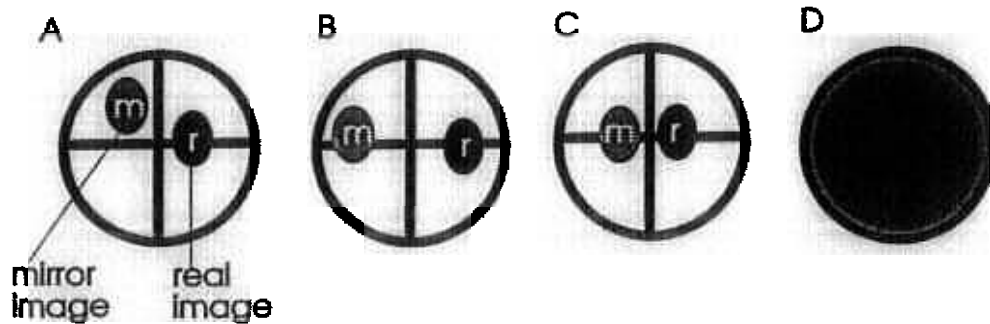
### Alignment Points

- 1. COLLECTOR LENS ADJUSTMENT:**  
Turning this black knob will simultaneously focus the real and mirror image.
- 2. LAMP VERTICAL ADJUSTMENT:**  
Turning this screw will change the vertical position of the lamp (primary beam) and adjust the real image up and down.
- 3. VERTICAL MIRROR IMAGE ADJUSTMENT:**  
Turning this screw will change the vertical position of the secondary image beam.
- 4. LAMP HORIZONTAL ADJUSTMENT:**  
Turning this screw will change the horizontal position of the lamp (primary beam) and adjust the real image left and right.
- 5. SECONDARY IMAGE FOCUS:**  
Turning this screw will change the focus of the secondary beam.
- 6. MIRROR HORIZONTAL ADJUSTMENT:**  
Turning this screw will change the horizontal position of the mirror and thus the position of the secondary beam.



**Alignment Procedure**

1. After you have installed for the first time or replaced the arc lamp, turn on the power and open the shutter in the microscope to allow visible illumination to be directed to the nosepiece. Take off one of the nosepiece dust caps or remove an objective from the nosepiece to allow the fluorescence light to be projected onto the stage area. Place a white piece of paper on the stage and move the reflector slider to the position which is the most dim.



2. Adjust the black collector focusing control (1) so that the real and mirror images are at their **smallest** size (the most focused). Remember that when you install a new lamp, the first adjustment that **usually** needs to be checked is the real image up and down control (2). Adjust the up and down control of the real image until both the real and mirror images are visible in the field (A).
3. Adjust the focus/size of the mirror image (5) so that the real and mirror images are at the same focus/size as shown in (B).
4. Adjust the real image position using again (2) and (4) so that the real image is centered up and down and is just to the side of center!
5. Once the REAL image is positioned, move the MIRROR image using left and right controls (8) and up and down controls (3) so that the mirror image is centered up and down and on the opposite side of center from the REAL image. Remember that although the REAL image controls move both the real and mirror images, the mirror image controls move only the mirror image.
6. Finally, by using the collector lens focusing control (1), defocus/spread the beam to achieve the most evenly illuminated field as shown in D. The final spreading of the beam is easiest checked on an H & E or an actual fluorescent specimen.

**NOTE:** A newly installed bulb should burn for at least 2 hours before being turned off. Always remember, the total lifetime of a bulb is a product of the total hours on the bulb as well as the number of times it has been ignited and average intensity setting.

## Troubleshooting

**PROBLEM:** You are experiencing uneven illumination.

**COURSE OF ACTION:** It is likely that the arc lamp needs to be realigned. Follow the procedures outlined in the lamp alignment section of this guide.

**PROBLEM:** The lamp won't ignite - no sparking when switch turned on.

**POSSIBLE REASONS:**

1. Safety switch in lamp housing is not properly depressed.
2. Lamp cord from Zeiss lamp socket not connected to power supply.
3. Power switch light is not on when switch is turned to on position- Check that the line cord is firmly plugged in and that power is present.
4. Fuse in power unit might need replacement if switch light does not come on. An extra 5A slow blow fuse is stored in the fuse compartment in the power inlet assembly (back of the power supply module). **CAUTION-** remove the line cord before changing a fuse.

**PROBLEM:** The lamp won't ignite- sparking but no ignition when switch turned on.

**POSSIBLE REASONS:**

1. Connections between lamp and electrode connections (lamp socket or copper wire) in lamp housing are loose.
2. Lamp is hot and must cool down before being re-ignited.
3. Lamp is defective.