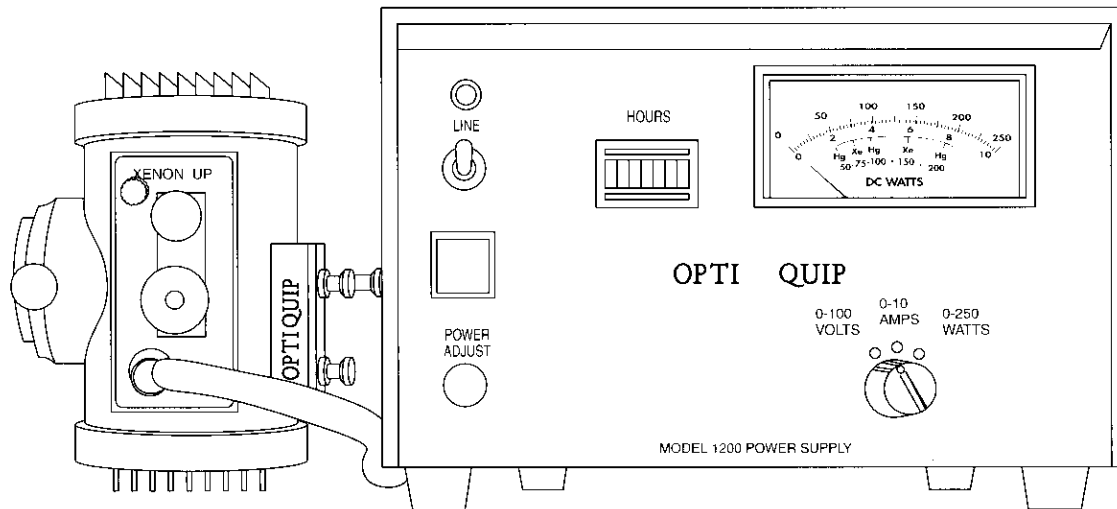




Nobska Lamphouse

Nobska Lamphouse Manual



MEIJI TECHNO CO.,LTD.
JAPAN

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1.0 Introduction

The Nobska is a compact lamp house which can accept 3 different lamps: a 100-watt Mercury, 75-watt Xenon, or 100-watt Hg/Xe combination lamp. The lamphouse can be run with either end up so all lamp controls are on either side of the lamphouse, depending on the user's preference.

The following items are included:

- One Nobska Lamphouse with side panel, dovetail adapter, and collector lens.
- One Model 1200 Power Supply
- One 1.5 mm allen wrench for the dovetail mount
- One 3/32 inch allen wrench for the lamp sockets
- One Trigger Lead and bulb clamp for 100 watt Mercury bulb
- One 100 Watt Mercury Bulb

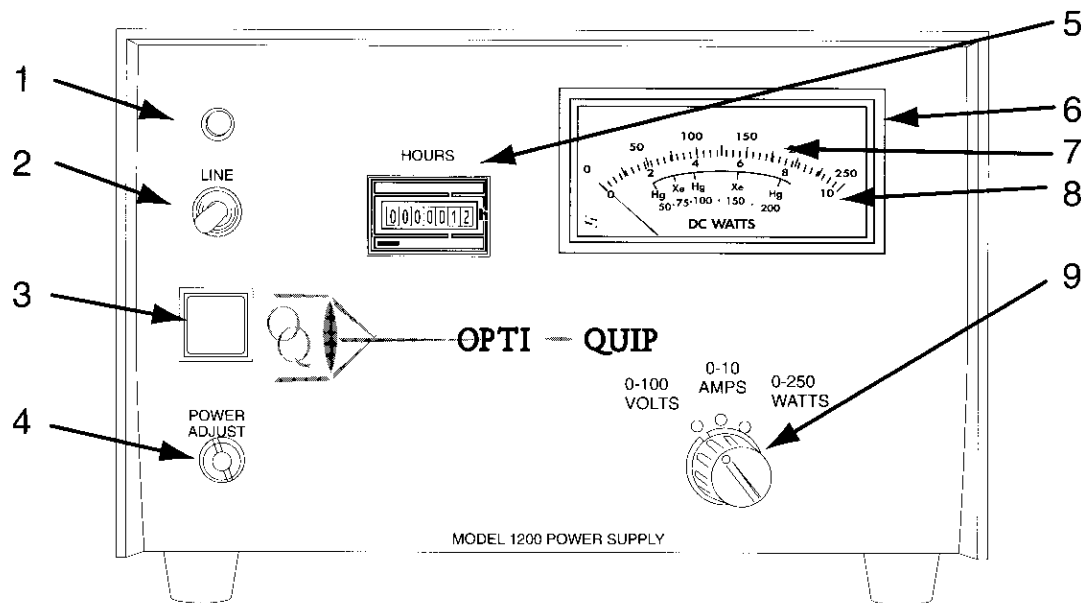
1.1 Nobska features

- Compact Design 6-5/8" x 3-1/2"
- Cool Running
- Stainless steel construction
- Dove tail mount via four 3mm cone tipped Allen set screws
- Designed for use with the Meiji Techno TC-5500 & TC-5600 Microscopes
- DC operation minimizes bulb flicker and give more light than AC lamps
- Fast Warm Up; Mercury bulbs come to full power in 4 minutes, Xenon 2 minutes
- Lamp changes are easy, no removal of lamphouse necessary

1.2 Features of Model 1200 Nobska Power Supply

- The 1200 can be used with a 100-watt Mercury lamp, a 75-watt Xenon lamp or 100-watt Hg/Xe combination lamp.
- The volt meter allows the user to monitor the aging of the bulb and therefore one can plan for timely replacement.
- The watt meter allows the user to adjust the power supply correctly for the particular bulb in use and therefore maximize bulb life.
- A non-resettable meter logs hours of use which is helpful in monitoring bulb life.
- A special regulating circuit insures that + 10% variations in line voltage result in less than a 1% change in output power.

Front Panel Organization



1. Pilot Light (Lights Up when supply is turned ON)
2. Power switch (Up - ON Position; Down - OFF Position)
3. Fuse Holder
4. Power Adjust
5. Hour Meter
6. Watt Meter
7. Upper Scale (Reads watts and indicates correct wattage for mercury lamps)
8. Lower Scale (Reads Amps or Volts and indicates correct amps for Xenon Lamps)
9. Meter Switch "Volts & Amps & Watts".

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2.0 Power Supply Operational Overview

Volt-Amp-Watt Meter

Mercury Lamps are designed to run at a constant current. The operating voltage increases during the life of the bulb and necessitates a concurrent reduction in operating current.

The watt meter integrates these two variables and allows the correct wattage to be set by use of the power adjust control on the front panel using a screwdriver.



The maximum current for xenon lamps must never be exceeded; otherwise operation is no longer safe and the lamp life will be reduced.

If the watt meter reading doesn't register on the scale of the meter, you can use the volt and amp meter readings and make a calculation what the watt reading would be. (Volts times amps equals watts). The bulb maker Osram states that a 5% variance either way (lamp running at too high or too low wattage) can decrease the life of the bulb. With practice, it is possible to gauge the age of the particular bulb in use, with the aid of the Volt-Amp-Watt meter.

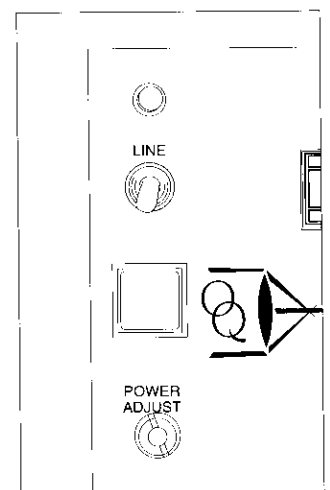
A new 100 watt mercury lamp runs at about 20 volts. As the bulb ages, the arc length grows and the power supply must supply a higher voltage to maintain the arc. While maintaining 100 watts, the operating current therefore drops. Older bulbs may require as much as 26 amps at 38 volts. The lengthening of the arc is the bulb aging.

Hour Meter

The built-in, non-resettable hour meter helps to the user to verify the hours of bulb life. The far right digit reads in tenths of an hour. It may be of importance to Opti-Quip if repairs become necessary, so have an idea of the total usage the power supply and the bulb have received.

Fuse

The power supply main line is fused with a front panel fuse holder. In the event it is necessary to change the fuse, push in and down on the fuse holder to remove it from the supply. Fuse can then be replaced in the holder. Replace only with MTH type fuses (formerly 3AG). 5 amp 250V for model 1200.



2.2 Power Supply Test

This procedure tests ONLY the proper operation of the power supply.

- Plug the power supply into a 110V grounded outlet.
- Set the dial below the watt meter to Volts position.
- Turn on the power switch. Pilot light should come on. If volts register, you know the supply is getting power and will run a bulb once it has triggered.
- Approximately 5 to 15 seconds after turning on the power switch, the sound of "ticking" or arcing will be heard. This is a high voltage triggering which ignites the bulb. **TURN OFF THE POWER SWITCH.**

You have now verified that your power supply is capable of supplying power and should operate normally.



UNPLUG THE SUPPLY FROM THE OUTLET BEFORE INSTALLING OR REPLACING BULBS.

2.3 Bulb Installation

It is critical to properly install the bulb in the socket. Reversed polarity can dramatically shorten the life expectancy of the particular bulb to as little as one or two minutes. The writing on the base of the bulb goes down (fits into the bottom of the socket) on both the Mercury and Xenon lamps.

When installing either bulb in these sockets the fat, positive (+) end of the bulb goes into the clamp and is tightened with the allen wrench.



Take steps to insure that the glass part of the bulb is not touched as oils from fingers will degrade the glass and cause pre-mature failure.

If you have any difficulty inserting the lamp into the socket, it may be possible that the stamping (lettering) on the bulb could be too raised. To insure a good contact, the bulb must fit down completely into the socket. A small file can be used to file down the letter stamping on the lamp.

Remove lamphouse side panel by loosening and rotating the two small black knobs counter-clockwise.

Notice the larger lamp mount with the 2 set screws. This is the side that will accept the larger (+) end of either the 100-watt Mercury or 75-watt Xenon lamps:

Ushio #	(-) Connection Cathode	(+) Connection Anode
(HBO) USH-102DH	7.5 mm ϕ	9 mm ϕ
OSRAM #	(-) Connection Cathode	(+) Connection Anode
XBO/75W	7.5 mm ϕ	9 mm ϕ

The above lamps use the same 7.5mm standard trigger lead for the cathode (-) connection.

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Step by Step Instructions

1. Set the panel down on a work surface such that the lamp mount faces you.
2. Plug the gold pin of the trigger lead into high voltage receptacle, if not already installed.
3. Slide desired lamp into the lamp holder. If the lamp is a Xenon type, rotate axially until the seal off nib faces the insulating plate to which the lamp holder is attached.
4. Slide the bulb clamp onto the negative (-) end of the lamp.
5. Hold the bulb clamp and trigger lead. Using the supplied allen wrench, tighten the clamping screws snugly and evenly. Be careful not to place ANY stress on the lamp.
6. Tighten two set screws on (+) side of lamp.
7. Pick up side panel with mounted lamp. Note markings on side panel "Xenon UP" and "Mercury Up". Rotate panel until appropriate end has the text facing correctly.
8. Insert panel in lamp house opening. Rotate and tighten the two black knobs clockwise to lock the door.
9. Plug the socket into the power supply and plug the power supply into the outlet.
10. Ignite lamp and adjust lamp house controls to get proper arc alignment within the field of view. Refer to the microscope instructions for more information regarding arc alignment. Once alignment has been set, it will not need any further adjustment until a new bulb is installed.

If you have any problems with this procedure, please contact your microscope sales person.

11. Once bulb has run for 4 or 5 minutes as has gotten sufficiently hot, set correct operating wattage by adjusting the control on the front panel marked "Power Adjust" with a small flat blade screwdriver while observing the front panel meter for the correct current for the correct bulb being used.



PROPER SAFETY GOGGLES AND PROTECTION ARE NECESSARY WHEN OPERATING EQUIPMENT THAT HAS ULTRA-VIOLET LIGHT CONTENT.

12. A new bulb should be run for two hours initially to stabilize the arc. After the initial "burn-in", the bulb should only have to be monitored occasionally by observing the volts and current readings on the power supply. Adjust the power adjust control on the power supply front panel to keep your bulb within operating range. This will insure proper bulb life.

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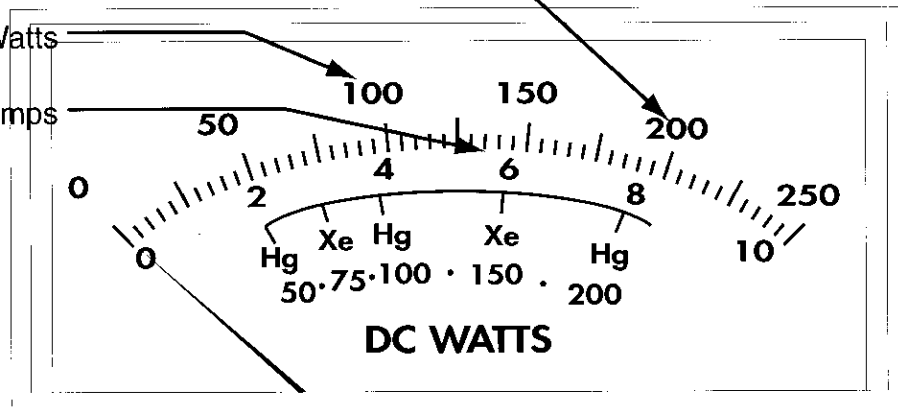
2.4 How to Read the Meter

To Read Watts - The top line of the scale is used to read watts. Set switch to "Watts" position. The top scale reads from 0 to 250. See "How to Adjust" for correct reading.

To Read Volts - The bottom line of the scale is used to read either "Volts" position, add 0 to indicated number for correct voltage. For example "2" really is 20 Volts.

To Read Amps - Each major division on scale is 1 amp, each small division is 0.2. For example, the line for "XBO 75" is 5.4 amps.

Bulb Type	Run At
200Watt Mercury	200Watts
100Watt Mercury	100Watts
75Watt Xenon	5.4 Amps



If the switch under the Watt meter is set to "amps" during ignition and warm up, no reading will be observed until the bulb actually is lit.

It should be noted that initially, mercury bulbs draw more than their nominally rated current.

Mercury Bulb	Nominal Current	Nominal Voltage
HBO 100W/2	5.0 amps	20 volts
HBO 200W/2	3.1-4.2 amps	47-65 volts

***NOTE**

Xenon lamps come up to their operation current almost immediately and should not ever exceed their ratings.

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2.5 Mercury Lamp Operation

As the bulb comes close to the normal operating temperature it will "stabilize". At this time, the arc which normally starts from the tip of one electrode and the side of the other, will jump to a position between the tips of both electrodes. In order for this to happen, the power supply automatically raises the operating voltage while the current is dropping during warm-up. This voltage will continue to rise until the arc stabilizes. If operating correctly, as the voltage rises, the current will drop until the correct wattage is maintained.

*** NOTE** Regularly check operating parameters while lamp is running "Watts" for mercury lamps. Use "Amps" for xenon lamps. If the reading is slightly off, you can use a screwdriver to turn the power adjust control on the front panel until you can obtain the exact reading desired.

Bulb Stabilization

*** NOTE** Plasma Streaming can be confused with Bulb flickering. Below are the methods that you can use to determine whether or not you bulb has stabilized.

DANGER Always observe the arc through appropriate filters.

DANGER Never look directly at an operating arc bulb without the proper safety goggles with appropriate filters.

You can see if the arc is occurring between the two electrodes. Watch the watt meter while bulb is warming up toward the proper watt reading. The needle will drop down very slightly and then go up when the arc has been maintained. Observe the reflection of light, if possible, on a wall or on a ceiling. The light will go off and on very quickly when the bulb stabilizes. The bulb may flicker repeatedly after it stabilizes. In this case, use the power adjust to adjust the watt reading up or down slightly and the flickering should stop. Difficulty with stabilization occurs occasionally with new bulbs, but usually disappears after several hours use. Bulb flicker is actually pretty rare with the 100 watt Mercury bulb.

If the bulb doesn't stabilize

If the bulb is old, you may have some trouble with stabilization. In this case, use the power adjustment to help the bulb stabilize. If it is a new bulb, the bulb needs to run for at least two hours to stabilize. The power adjust may be used in this case to aid the bulb in stabilizing. If the bulb goes out, always let it cool for five minutes before re-igniting. Bulbs must always be run in the correct wattage.

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***NOTE** If the bulb does not stabilize, the power supply will automatically raise the operating voltage and lower the operating current to a point where the arc will no longer be maintained. At this point the bulb will stop working and the power supply will automatically start triggering again. Note the amp (current) reading when the bulb does go off. Restart the bulb. Use the power adjust to assist an old bulb (with high voltage) to get started. The old bulb may go on and off while the supply is triggering. If you replace the bulb and there is no longer an on/off phenomenon, you will then know that the bulb was indeed at end-of-life.

Bulb Lifetime

Diminution of light output and lack of stability are indicative of a need for bulb replacement. The operating voltage of a 100 watt mercury bulb is an indicator of the aging process.

New bulbs start life operating around 20 volts.

Once the operating voltage has reached about 38 volts, they should be replaced.

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3.0 Troubleshooting and Servicing

***NOTE** The serial number of the power supply is on the back panel. If the occasion should ever arise that your power supply needs servicing and must be returned to Opti-Quip, please note the serial number of your supply and always return the socket that you use along with the power supply.

If Servicing Becomes Necessary:

- Turn off the power supply.
- Leave the supply plugged into the outlet for about five minutes after turning it off. This gives the capacitors a chance to discharge completely.
- Unplug the supply from the outlet.
- Disconnect the socket from the power supply.
- Contact Opti-Quip for return information at (845) 928-2254

Possible Problems

1. "Arcing Over" (Trigger leakage)

When the supply has been turned on and a loud snapping noise is heard coming from the lamphouse, the supply should be turned off immediately. "Arcing Over" can be caused by:

- A) A defective socket (in this case the "snapping" sound will be heard coming from the lamphouse).
- B) Haphazard socket or bulb installation may result in wires being too close or clamped in the lamphouse door. "Arcing Over" will occur only when the supply is triggering or starting up. If this phenomenon occurs, turn the supply off immediately. If this happens excessively, the fuse or an internal circuit may burn out.

2. Blowing Fuses

The length of time it takes for a fuse to fail can be indicative of the reason for failure.

If the fuse blew as soon as power switch is turned on, disconnect lamp socket and replace the fuse. If problem goes away, look for a short circuit between lamphouse and the socket.

If problem remains, the socket and power supply should be returned for repair. If the power supply is new, examine for indications of shipping damage.

If failure occurs after power supply has started to trigger, proceed as mentioned. The probable cause is in socket or the bulb installation. Correct as needed.

If failure occurs after power supply has ignited the bulb and bulb has warmed up, the probable cause is a loose connection. This will cause grossly erroneous readings in the watt meter. A very loose connection will cause arcing with rapid severe heating of adjacent parts. The top connection to bulb is the first place to look. Arcing here will cause metal parts to be blackened or turn dark blue. This over heating will greatly reduce the life of the bulb.

3. Intermittent Operation

In a situation where heavy equipment such as a centrifuge or a cooler is connected to the same branch circuit as the Model 1200 power supply, it is possible that a power dip may cause the lamp may momentarily go out when this type of equipment is being started.

When this occurs, the phenomenon may be eliminated by connecting the power supply to a Sola(tm) Constant Voltage Transformer.

A transformer with a 400-500 watt rating should be used.

4. RFI (Radio Frequency Interference)

Arc lamps emit RF during operation. This interference may affect television equipment. This is characterized by horizontal interference lines on the video screen.

Several things can be done to keep this to a minimum:

- Where ever possible use a camera that has its electronics inside the same case.
- Be sure the interconnecting cable between camera and monitor is well shielded.
- Re-position power supply and monitor to effect minimum interference

Another possible solution would be to connect the power supply to a circuit which is on the other side of the main from the television equipment.

An electrician in your building should be able to figure this out for you.

5. Radio Frequency Interference During Triggering

The high voltage trigger used to ignite arc lamps gives off large amounts of RF. This interference goes away after the bulb is ignited.

To minimize the possible problems in this area, we suggest that during the initial start up, be sure lamp power supply is the first item turned on, and then afterwards the other auxiliary equipment be turned on.

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3.1 TROUBLESHOOTING AT A GLANCE

<u>SYMPTOM</u>	<u>CAUSE</u>	<u>CORRECTION</u>
Loud Noise is heard coming wires from lamphouse touching	"Arcing Over" (trigger leaking)	Defective socket close to or Lamphouse
Supply stops operating for no apparent reason	Blown Fuse (no triggering sound heard from supply)	Replace fuse.
Bulb hasn't stabilized	Turn off for 5 minutes and Restart. Use power adjust to encourage lamp to stabilize	
"Brown-out" (triggering will Transformer be heard from supply)		Install Sola
Arcing (blows fuse),		Clean and Tighten connections
Blows fuse		Short circuit in lamp housing.
Try disconnecting lamp Connector on rear panel and try again. If problem persists, it's possibly a defective power SCR or diode		
Lamp flashes but will not Ignite.	Power adjust set too low.	Increase current.

4.0 Technical Information

Replacement Parts List

<u>Part Number</u>	<u>Description</u>
HM-08	Trigger Wire and Clamp for 75, 100watt Xenon & 100watt Mercury
BA-005	HBO 100W/2 Mercury Lamp

Integrated Circuit Description

There are six integrated circuits used in the Model 1200 power supplies which are easy to replace and can sometimes solve minor problems with the power supply.

IC (1) LM556 supplies the trigger pulses to the regulating SCR's

IC (2) LM324 drives IC (1), and performs all regulating functions, except for the current sense amplifier, which is in IC#3.

IC (3) LM324 section (2) is the current sense amp. Sections (1) and (4) Control the Hi voltage trigger, and section (3) prevents an over voltage condition prior to lamp ignition.

IC (4) LM324 & IC (2) LM556 Comprises the multiplying wattmeter circuit.

IC (2) 4016BCP is an electronic switch that selects the signal for the front panel meter

When Replacing Integrated Circuits

Before removing the IC from the board, please note the polarity on the IC.

Polarity must be correct. Replace the IC in the same direction as you found it on the board.

Look for the mark on the IC. (There may be more than one). This indicates the direction for insertion. Be sure the prongs are straight. Do not bend pins during insertion.

An Opti-quip engineer is available during business hours at (845) 928-2254 or e-mail at optiquip@warwick.net.



NOTE When emailing Opti-Quip, be sure to put into the subject header: "Nobska Power Supply" so that your email is handled effectively.

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5.0 Bulb Selection Criteria

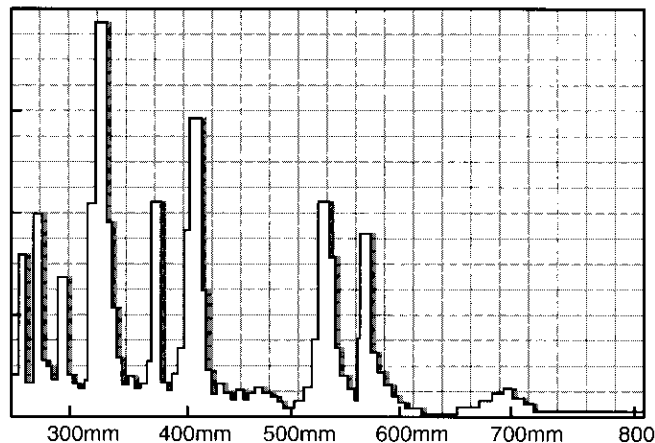
Light Sources for Fluorescence Imaging

Light sources need to be very stable and that is why the majority of power supplies use DC or direct current.

In addition, there are no idea light sources that produce an even spectral distribution nor a useful wavelength range (near UV through near IR).

Mercury Lamps

For as common as mercury lamps are in microscopy, they produce a very uneven emission spectrum with very pronounced "peaks" in the near UV (365nm), violet (406nm), blue (435nm), green (546nm) and yellow (578nm) as shown in the photo below.



Unfortunately, many of the popular dyes and probe fluorochromes such as calcium green and green fluorescent protein (GFP) require a strong emission spectrum around 480nm. And as you can see from the chart above, mercury lamps produce a weak signal at that frequency. This is why 50-200 watt mercury arc lamps or "burners" are used; to produce enough brightness at the right frequency by brute force and by the size of arc produced.

Xenon Lamps

The other type of arc lamp used in microscopy is xenon. Xenon burners emit a much more even visible light range than mercury. Its intensity also falls off near ultra-violet, however, it is still suitable and preferred for use with UV dyes and probe fluorochromes such as GFP.

Mercury-xenon Lamps

This newer type of lamp uses a mixture of both gases which combines the characteristics of the two. Peak to peak intensity fluctuations throughout the spectrum are less severe which works better for microscopy and bulb life is much improved as well.

6.0 UV Light Safety Considerations

Mercury arc lamps have UV light content in their output. The U.S. National Institute for Occupational Safety and Health (NIOSH) recommends that exposure to UV energy be controlled and limited as much as practically possible.

Exposure to UV radiation even for very brief periods of time can be hazardous. The potential damage depends on exposure time, the type of UV light and the individuals sensitivity to UV.

UV light causes sunburn. Long term exposure can result in loss of skin elasticity initially and carcinoma eventually.

Absorption of UV light by the eyes will cause inflammation of the cornea called photo keratitis. Continued exposure can lead to the formation of cataracts on the eye lens.

Therefore, the following safety considerations should be taken very seriously:

- Limit access to areas where UV light is present.
- Post warning signs in the area where the equipment is installed.
- Always wear protective eyewear and gloves.
- Be sure your arms and neck are covered.
- Never directly look at the light source.
- Close off the light source with the filter slider when not being used.



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